IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication DECEMBER 1, 1960

Lew Merrim

★ Frank Pace, Jr. and Dr. Henry Wriston Present—

Bipartisan Report On National Goals p. 95

Do You Need a Consultant? p. 102

Isotopes for Space Age Tests p. 127

Digest of the Week p. 2-3

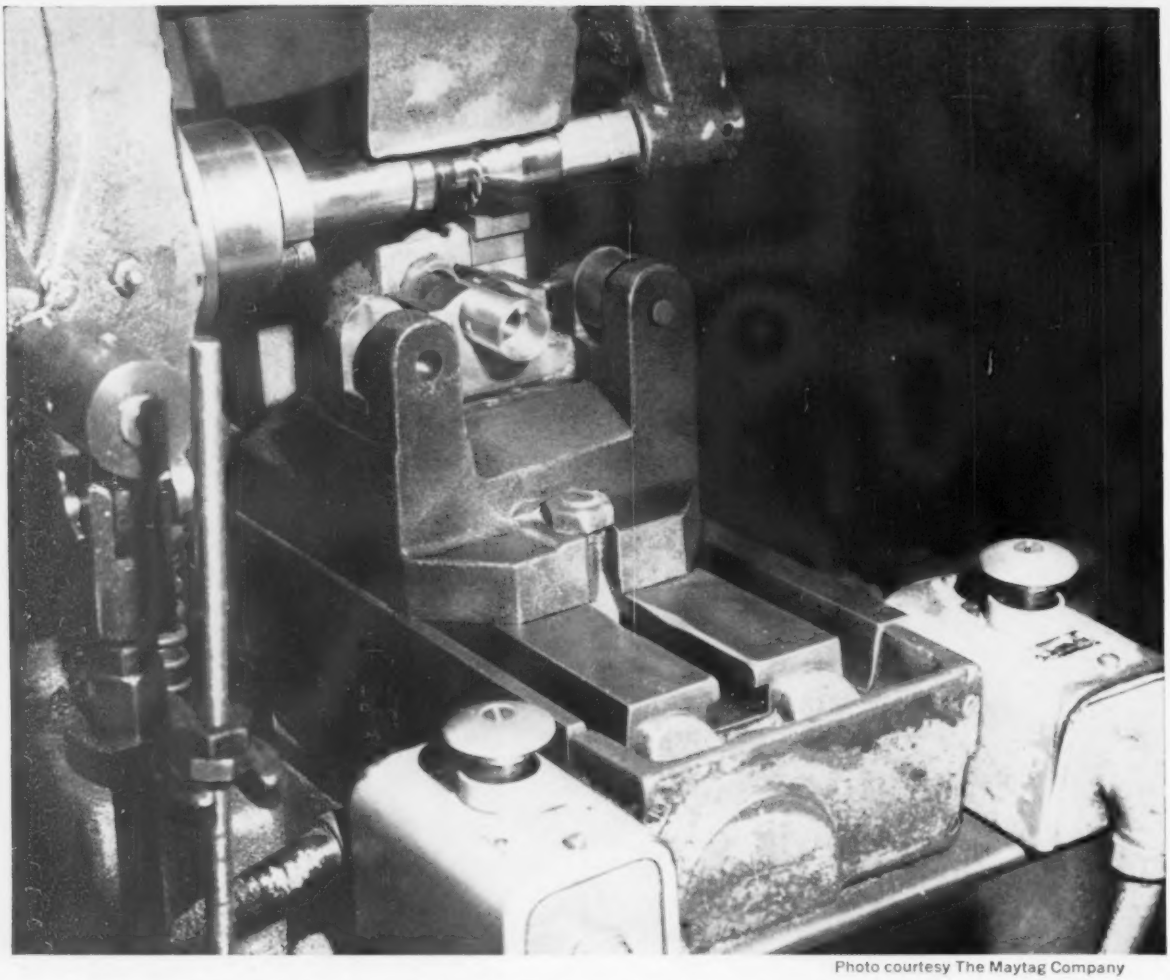

Photo courtesy The Maytag Company

Aristoloy Leaded 8620 cuts tool changes 50% on wringer drive sleeve for Maytag

Has working time been reduced? Yes.

In what way? The use of Aristoloy Leaded* has increased tool life and reduced downtime for tool changes.

Has machining been improved? Yes.

What inherent quality in the steel is responsible for improved machining? A more uniform, satisfactory microstructure provides better machining characteristics.

What operation is performed? Automatic screw machines bore, counterbore and cut off. Secondary operations include milling, drilling, internal and external grinding after carburizing.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city—or write for NEW PRODUCTS & FACILITIES CATALOG.

*Inland Ledloy License

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Bethlehem vacuum-degassed steel minimizes the hazard of roll breakage.

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The IRON AGE

December 1, 1960—Vol. 186, No. 22

Digest of the Week in

*Starred items are digested at right.

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News of the Industry

STEEL WAGES

Cost Squeeze—The second round of labor cost increases within the steel industry takes effect today. This, along with other factors, causes top management personnel to worry about cost bulges. P. 98

STANDARDS BATTLE

Long Row — The Russians say they'll be outproducing the U. S. in steel by 1970. It could happen, but they would still have a long and hard time to attain the standard of living enjoyed by the U. S. P. 99

ST. LAWRENCE SEAWAY

Optimistic—Tonnage on the St. Lawrence Seaway this year slightly trailed 1959. However, officials feel

many problems have been ironed out and are optimistic about the Seaway activity next year. P. 100

SILVER CRISIS

Stockpile Down — Government stocks of silver will be depleted in

Metalworking

Cover Feature

NATIONAL GOALS—Frank Pace Jr. (left) and Henry M. Wriston, members of the President's Commission on National Goals, join other members in this special feature announcing the Commission's proposals.

two years at present withdrawal rate. Silver men wonder what will happen to market when, and if, these stocks run out. P. 101

CONSTRUCTION

Good Winds—The Kennedy Administration may be the factor that pulls the construction industry out of the doldrums. Business is expected to climb by the second half of 1961, with public works spending giving it a healthy boost. P. 103

Engineering-Production Developments

USE RADIOISOTOPES

To Improve Inspection—Radioisotopes can broaden your nondestructive-testing program. The atomic-energy source, sealed safely in a camera, is surrounded by lead shielding. Finished radiographs monitor the internal quality of parts. Defects show up due to their density differences. P. 127

TWO CASTING PROCESSES

Improve Foundry Efficiency—Ceramic-shell molds are easy to make. Investment molds cost a lot more; but they're much more accurate. By combining these processes, a foundry improves casting quality while reducing overall costs. P. 130

ALLOY WIRE

Brakes Jet Planes—Brakes on jet aircraft are subjected to many landing conditions. At all times, they must provide safe, reliable stops. For top performance, these brakes rely quite heavily on their return springs. Spring wire made from A-286 alloy insures stress-temperature stability at 1000°F. P. 132

BULK OIL STORAGE

Reduces Costs—Oil costs a lot less per gallon when you buy it in bulk. By buying in quantity, you may be able to save enough money to pay for a modern bulk-storage setup. This would also reduce your oil handling expenses. P. 134

USE SPECIAL TECHNIQUE

For Rolling Beryllium—Despite its desirable properties, the wide use of beryllium has been hampered by sheet-making problems. A cladding and cross-rolling technique proves successful in making sheets up to 84 x 24 x 0.04 in. P. 136

Market and Price Trends

MACHINE TOOLS

Cancellations—Optimism generated by the recent Machine Tool Exposition may have been unjustified. Largely responsible for what appears to be a bad year for the machine tool industry are cancellations by General Motors. P. 113

WEST COAST

Space Payoff—The big money in space projects is yet to come. But there are many problems that must first be solved. The company that comes forth with solutions will land the big contracts. P. 111

STEEL SUMMARY

Still on Bottom—This week the steel market enters its six consecutive month operating close to 50 pct of capacity. No immediate upturn is in sight as major consumers continue lethargic. One hopeful note is in January automotive orders. While not sensational, they indicate a fair month. P. 169

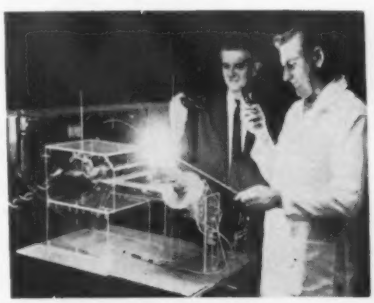
PURCHASING

Simple Approach—Clinton Bishop, Purchasing Agent for Alan Wood Steel Co., likes the buying approach that is "simple but effective." It has paid off, even in the area of negotiated buying. P. 176

NEXT WEEK

NEW MACHINING METHODS

Fill Industrial Gap—Special machining methods are the subject of next week's report on "How to Get More for Your Metalworking Dollar." This report tells how you can form complex shapes from the new wonder metals.



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Mr. Anderson's Mission: Was it a Dismal Failure?

No man in the news recently has been clobbered more by some sections of the press than has Secretary of the Treasury Robert B. Anderson. And no man has deserved it less.

The national press corps is of the best. But, like all professions, it, too, has its problems. It is not infallible although it labors hard to be objective.

Sometimes some of its members—unintentionally, no doubt—furnish a sounding board for disgruntled government officials who enjoy playing God.

It has been suggested that Mr. Anderson did not seek out the proper people to advise him before going to Germany where he laid it on the line about our balance of payments difficulties. Some critical stories refer to "sources" who sought to advise Mr. Anderson, disagreed with him, or generally thought he was a simple soul who did not know what he was doing.

All of us should know that Mr. Anderson—since he took office—has battled inflation tooth and nail. We should know that he has not adopted his Spartan view only recently on our international balance trouble—as one editorial in a prominent newspaper suggested. For two years, he has been talking to anyone who would listen—and there were few who did.

Some "sources" reluctantly concede that an "unintentional" result of Mr. Anderson's blunt talk to the West Germans was to alert Europeans to the seriousness of our trouble. This is insulting and gratuitous. Actually, Mr. Anderson went to Europe to tell the blunt truth as he saw it.

All the holier-than-thou talk in some quarters—viewing with alarm and suspicion Mr. Anderson's mission—seems absurd to those who know the Treasury Secretary. The viciousness of some opinions of unnamed government officials far transcend a mature criticism of the Secretary.

Mr. Anderson never grinds his own axe. He has no history of being a square. No record of his plotting or undermining exists. His sense of integrity is unimpeachable. And his patriotism is unquestioned.

His mission was a success if its purpose was to alert Europeans, and us, to the serious plight of the dollar. That was his mission.

The storm over what he did and how he did it may have come from those who, for 15 years, have been giving away a lot of our American dollars without thought of the ultimate results.

The reckoning is at hand!

Tom Campbell

Editor-in-Chief

ORDER AFTER ORDER AFT
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Stainless Sheet...Exactly the Same Order After Order...From A-L

Every lot of stainless sheet will go through your plant with consistent good results when the stainless is from Allegheny Ludlum. There will be none of the hidden costs that come from production delays due to variations. That's because A-L stainless sheet is processed under strict quality control—from chemistry to finished gage to pickling solutions and right on through the entire cycle.

A-L quality control extends to you, the user. Our mill people make regular visits to check on the quality being furnished customers. You need only a phone call to get help in processing stainless from Allegheny Ludlum.

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1718

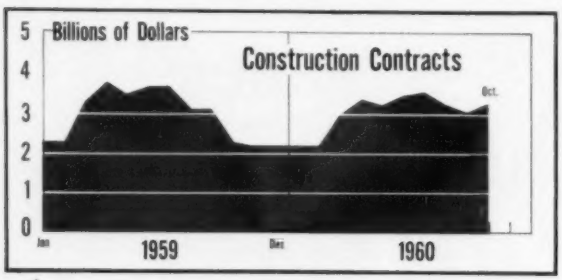
No Real Upturn Until Mid-1961

With the election out of the way, many people in government (and in business) are now talking realistically about the level of business. And it isn't encouraging. The Dept. of Commerce, the official optimists in government, now sees "no evidence of a widespread change in the new order flow which would stimulate manufacturing operations." In other words, no short-term reason for optimism.

Best guess, and it isn't much more than that, is a static level of business well into 1961. Some indications of an upturn should show up by mid-year. By Labor Day, a full-fledged upswing could be under way.

Strong Construction Indicators

In overall construction, contracts in October hit an all-time record for the month, according to F. W. Dodge Corp. October awards totaled $3.3 billion, up



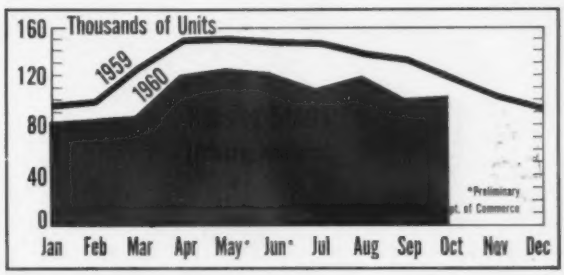
from $3.1 billion in September and 6 pct over the same month last year. Strength in the construction industry is in increased contracts for commercial building and highways. Other gainers: Hospitals, recreational, public, and school buildings.

Straws in the Business Wind

Many businessmen have their own indicators that experience tells them can call the business turn. Here's one that comes from a top Midwestern executive: His company's hydraulic business has in the past been a lead indicator. This year, the division bottomed out in October, started up a bit in November. If the uptrend continues through December, it could mean a general business improvement starting as early as April.

Some Pickup in Home Starts

Home starts in October defied the rules and picked up slightly. Private, nonfarm housing starts reached 103,800 for the month, up from September's disappointing 94,700. The October upturn had not been predicted and went against the rate of building permits issued in the previous month. However, building permits issued in October are at a seasonally adjusted annual rate of 899,000 and do not indicate any continuation of the pickup.



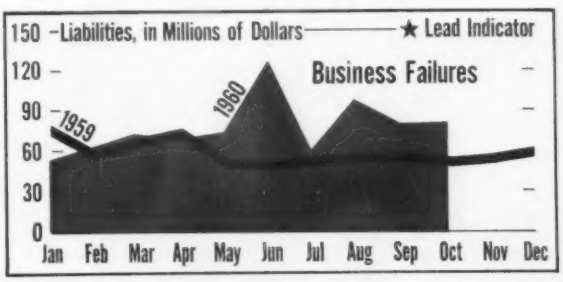
Bad Steel Omens from Abroad

More than the usual quota of top steel men have been touring Europe and Asia this year, and not on vacations. These unpublicized tours have not resulted in encouraging reports. These men see tough days ahead for American steel abroad and at home. Some believe that if business drops off in Europe, as may be the case, European steelmakers will really descend on U. S. markets.

Furthermore, foreign steelmakers are producing top quality steel and will upgrade delivery and other merchandising factors. This is one of the big reasons why U. S. steelmakers are determined to keep costs, particularly labor costs, under control.

Business Failures Climb

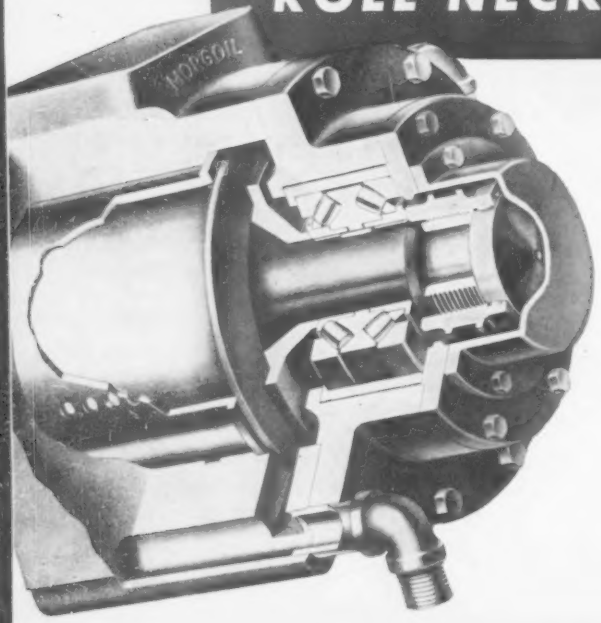
Although the dollar liability of business failures edged up only moderately in October, Dun & Bradstreet reports the number of failures was the highest since April. Liabilities for the month totaled $81.5 million, compared with $80.6 million in September and $50 million in October of 1959.



For HIGH CAPACITY at ANY ~~SPEED~~

44"—90 MORGOILS—In action at speeds up to 7,000 feet per minute on 23" and 56" x 52" Five Stand Tandem Cold Mill. Weirton Steel Company, Division of National Steel Corporation.

MORGOIL
ROLL NECK BEARINGS



MORGOIL—the bearing that gives the greatest capacity and the longest life regardless of speed—gives modern high speed rolling mills top quality production with minimum down time due to bearing or roll neck failure.

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WORCESTER, MASSACHUSETTS

ROLLING MILLS MORGOIL BEARINGS GAS PRODUCERS
WIRE MILLS EJECTORS REGENERATIVE FURNACE CONTROL

MB-32

COPE: Labor Checks Its Election Score

Labor has made it plain that President-elect Kennedy owes a political debt.

James L. McDevitt, national director of AFL-CIO's Committee on Political Education, says that **without COPE "the election would have been lost."**

As evidence, he cites the Kennedy majorities produced in 14 key areas where large numbers of AFL-CIO members vote. The 14: Baltimore, Boston, Buffalo, Chicago, Cleveland, Detroit, Los Angeles, Minneapolis-St. Paul, Metropolitan New York-New England-New Jersey, Philadelphia, Pittsburgh, St. Louis, San Francisco, and Washington, D. C.

In Senate races, 15 of 24 COPE-backed candidates won. Five of the losers were given little chance anyway. Its gubernatorial record was 14 in 23 contests, with four races "regarded as nearly hopeless" from the onset. For the House, 157 of 258 candidates supported by COPE were elected.

UAW: Ford, GM Nix Informal Talks

Automakers have turned down UAW president Walter Reuther's proposal to hold labor-management discussions away from the bargaining table.

Replying for Ford Motor Co., K. D. Cassidy, vice president-industrial relations, told the union:

"We do not believe that a general objective of acting in concert with the UAW, or with our competitors and the UAW, as you propose, is either sound or consistent with the function that each of us has in the American scheme of things."

Instead, he proposed that top Ford and union officials continue to meet from time-to-time **"on an informal, nonbargaining basis conducive to frank discussions . . ."** He pointed out that Mr. Reuther's proposal **"is expressly directed at and confined to joint (industry) action on matters outside the scope of collective bargaining."**

Shirttail Pay Raise For White Collars?

Pay increase due to Steelworkers today will probably be passed along to nonexempt salaried workers, but not to exempt salaried employees. However, exceptions will have to be made in the case of some first line supervisors in order to keep them ahead of production workers. Another reason: USWA is actively seeking white collar members.

USWA: Cost Worries

Steel's labor contract has produced a curious situation: The union is pushing to reduce company costs. Later this month, Steelworkers will meet with American Medical Assn. to find way to cut cost of the Hospitalization insurance program paid by the companies. Contract says that 3¢, available for c-o-l increases, will go to insurance if cost gets too high.

Steel: A Formula for Peace?

A former union official, now a small businessman, has thrown the book at the Steelworkers' union — and several pages at management.

Harold J. Ruttenberg, former research director of the USWA, is so hopped-up over union-management peace that he has written a book.

Mr. Ruttenberg regrets the last strike. But he seems to think it was necessary to get the message across to union officials that the honeymoon is over.

In "Self Developing America" (Harper & Bros., N. Y.) the author sets up a formula for a long-term settlement which will save the steel industry, help the worker, dignify the union, and assist the consumer and public.

Here it is in capsule form:

Agree on a measure of productivity which will determine future labor gains and stabilize steel prices.

Resolve the never-ending, always-recurring problems of worker-management and union-company relations.

Negotiate a pay-by-the-year contract that will assure those with two or more years service of pay for 52 40-hour weeks. This is to be in effect by year "X." He says year "X" can be some time in the '60's; if set up as a goal it will allay fears of job security that "the strike caused and union leaders exploited."

In substance, Mr. Ruttenberg advocates an annual wage without the various types of additional compensation such as overtime, shift differential, etc.

He has a simple formula which guarantees a full year's pay at straight time. Increases would be granted on a basis of more pay for more work, based on productivity. Prices are to be stabilized, and mutual trust is to be generated.

Mr. Ruttenberg will probably turn out to have been right — along about 1970.

Held down "impossible" job for months vs. days

They were asking the "impossible" at this big West Coast mine. The hose used in their big beneficiation plant must be tough enough to handle the flow of murderously abrasive iron-ore slurry. Yet it still must be flexible enough to follow a twisting, bending course down from the top of the seven-story structure.

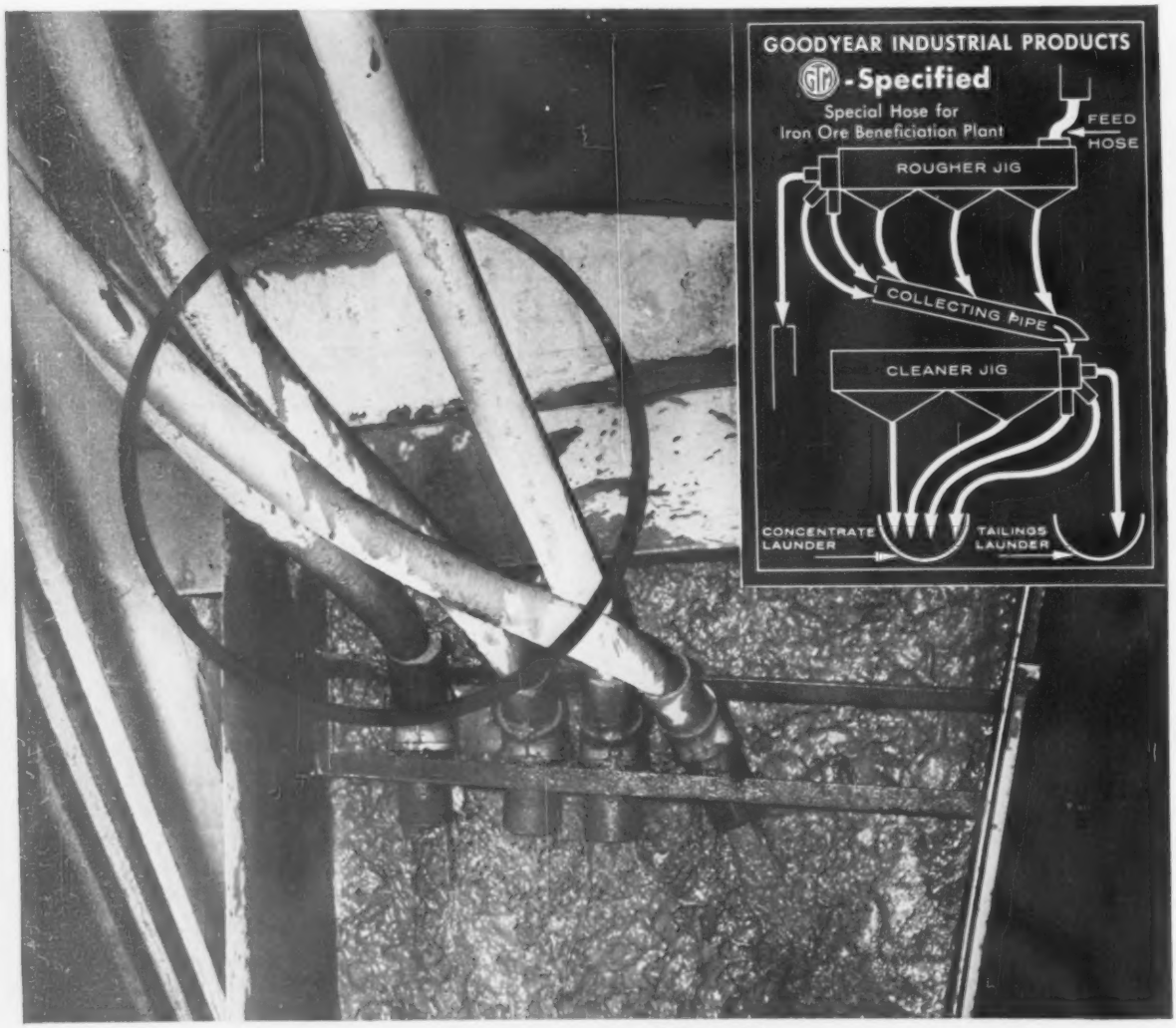
So it's little wonder their first hose sprang numerous leaks almost immediately – was finished completely in about 45 days. It wasn't until the G.T.M. – Goodyear Technical Man – recommended his special ore-carrying hose that they got satisfactory service.

In fact, the G.T.M.'s hose has been so successful that the company's purchased over 4,000 feet of it to date. It's been on the job over 12 months now – completely mastering this extra-tough job.

So once again, the G.T.M. has proved that the "impossible" often boils down to right hose – and the right recommendation. Make sure you get both–by contacting your Goodyear Distributor – or writing Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on V-Belts, Hose, Flat Belts and many other industrial rubber and non-rubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*



HOSE FOR ALL INDUSTRY BY

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★ Clamp-Down on Influence

The new Congress and the new Administration will clamp tight restrictions on contacts between businessmen and officials of U. S. regulatory agencies.

Legislation expected to get early congressional support will set up new rules of conduct for any behind-the-scenes contacts. Such rules against influence by businessmen have the backing of President-elect John F. Kennedy.

The new laws will make contacts between agencies and companies they regulate a matter of public record. If the contact concerns a case pending before an agency, it will have to be open to public scrutiny.

Bluntly, the proposed law will forbid any ex parte communication between agency personnel on the decision-making level and any outsiders.

The principal backer of the legislation is Rep. Oren Harris, D., Ark., who has had House influence investigators working between sessions to put the case against contacts in final form. The investigators say everything is ready.

Restrictions on contacts are in line with President-elect Kennedy's reorganization plans for the "big six" regulatory agencies.

Two other actions against influence will get backing from Kennedy and Congress. They are:

1. Tighter restrictions on policies dealing with financial interest of agency officials in companies doing business with the agency.

2. "Conflict of interest" legislation to stop former government officials from using their influence as representatives of private industry.

■ GOP Scrambles For Party Leadership

The fight for top spot in the Republican party after its hairbreadth loss of the White House will be something to watch.

It boils down to a battle between three men, defeated presidential candidate Richard M. Nixon, Arizona Senator Barry M. Goldwater, and New York Governor Nelson A. Rockefeller.

Senator Goldwater is the spokesman for conservatism. Though his personal prestige has been growing by leaps and bounds, his politics don't seem to have enough support to put him in power. Gov. Rockefeller is the leading Republican liberal. As such, he is Goldwater's arch enemy. His politics seem to give him a slight edge over the Arizona Senator.

But the man to watch is Richard Nixon. While Goldwater and Rockefeller battle at the right and left, Nixon still has strong support.

■ SBA to Expand

Small businessmen can look for more aid from the government under the Kennedy Administration. The President-elect has already pledged that "in 1961 we are going to have to protect the right of small businessmen to compete."

Protection will be particularly through expanded activity by the Small Business Administration.

■ Last Call on Depreciation Survey

U. S. Treasury Dept. officials waiting for some tardy depreciation survey replies from industry will not wait much longer.

They say they will begin tabulating the industry answers to depreciation questions in a few weeks, with or without replies from the late companies.

The tax men want to have the survey ready for Congress when it convenes in January. There is also some hope the survey will be completed before the present administration leaves office in late January, though it is doubtful.

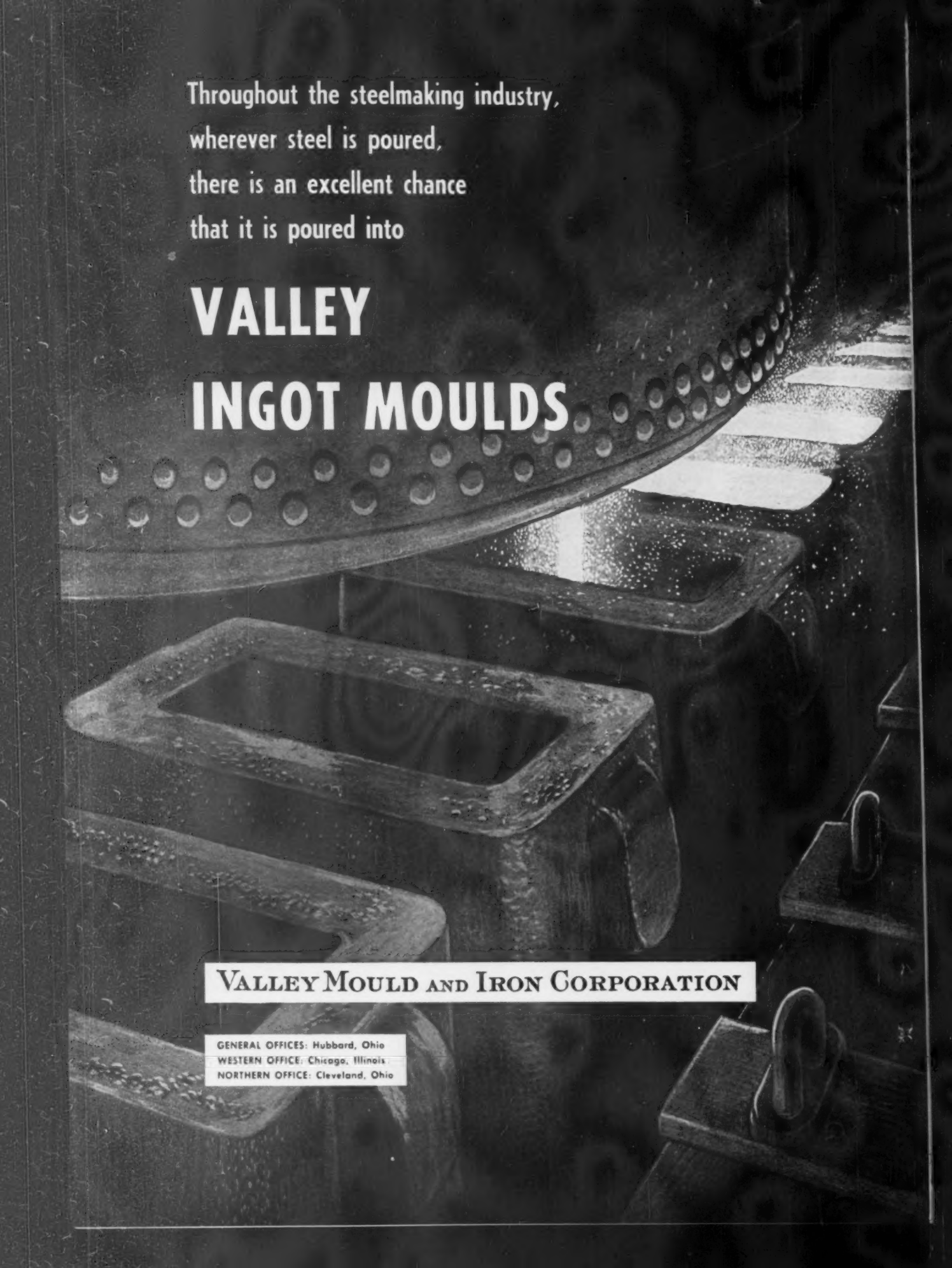
■ Next Congress: How Liberal?

Congressional feeling on President-elect Kennedy's chances for success of his liberal program before the 87th Congress varies with the political party of the congressman.

Democratic Senator Thomas J. Dodd, of Conn., predicts that north-

ern and southern Democrats will join hands in the first few weeks of the coming session. He says they will push Kennedy's program. Senator Dodd likened the push to the early days of Franklin D. Roosevelt's New Deal.

House minority leader Charles Halleck, of Ind., says he is confident the "wildeyed spending schemes" of Democrats would meet severe opposition in the House.


Throughout the steelmaking industry,
wherever steel is poured,
there is an excellent chance
that it is poured into
VALLEY
INGOT MOULDS
VALLEY MOULD AND IRON CORPORATION
GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio

New Import Rules For Vehicles

Importers of cars, trucks, buses, and other vehicles and parts will have to meet new regulations for bonding shipments arriving in this country in 1961.

New regulations, adopted by the Internal Revenue Service, go into effect Jan. 1. Import bonds are required to insure that excise taxes are paid on all imported vehicles. They may be forfeited if an importer attempts to defraud the U. S. of taxes due, falsifies information on tax returns, or fails to pay taxes on time.

In general, the bond must be equal to the amount of tax which the importer expects to pay during an average calendar quarter.

No bond is required for vehicles brought in for personal use, imported for re-export to another country or U. S. possession, or returned to this country after having been purchased here and exported.

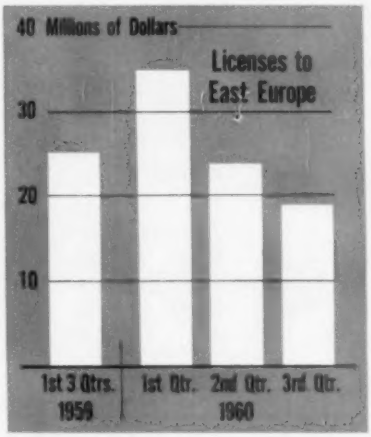
The new rules list acceptable types of bonds or sureties, information to be submitted by importers in applying for bonding and in determining whether a bond is required, and methods of changing bonds.

Exports to E. Europe Drop in 3d Quarter

The value of U. S. goods licensed for export to Eastern Europe has dropped from the high point reached early in the year, says the Dept. of Commerce.

Total value of Eastern Europe-bound goods in the third quarter dropped $19.5 million, down from the high of $35 million reached in the first quarter of 1960. Second quarter totals were $24.5 million.

The 1960 three quarter totals, however, far surpass the $25.3 million mark reached for the same period in 1959.



Commerce says, though, that while the total value of export license applications approved in the first nine months of 1960 represents about 85 pct of the total processed during this period, it is impossible to predict what proportions of the licensed goods will actually be shipped.

Among commodities approved for export to Eastern Europe were transportation equipment for Hungary; cold-rolled sheet steel to Russia, East Germany, Czechoslovakia and Rumania; industrial equipment to Russia; and chemicals and plastics to Czechoslovakia and East Germany.

British Project Veiled In Secrecy

British electronics and hydraulics engineers are working on a secret project that may revolutionize machine shops.

The project calls for the operation of a machine shop completely by remote control.

The object is that operators looking at television screens in a central control room would be able to conduct high precision machining work by turning knobs on.

W. German Steelmakers In Boom Period

West German steelmakers are enjoying a boom period while their American counterparts are hoping for a business upswing some time next year.

Phoenix-Rheinrohr A. G., a leading West German steelmaker, reports business in the fiscal year ended Sept. 30, 1960, was about 30 pct better than in the previous year.

In the period just closed, P-R received $428 million for 3.2 million tons of crude steel and 747,000 tons of pipe. In the previous fiscal year the company received $333 million for 2.4 million tons of steel and 583,000 tons of pipe.

Computer Competition Getting Tougher

While domestic competition for the computer market continues to rise, foreign manufacturerrs are beginning to aim at U. S. markets.

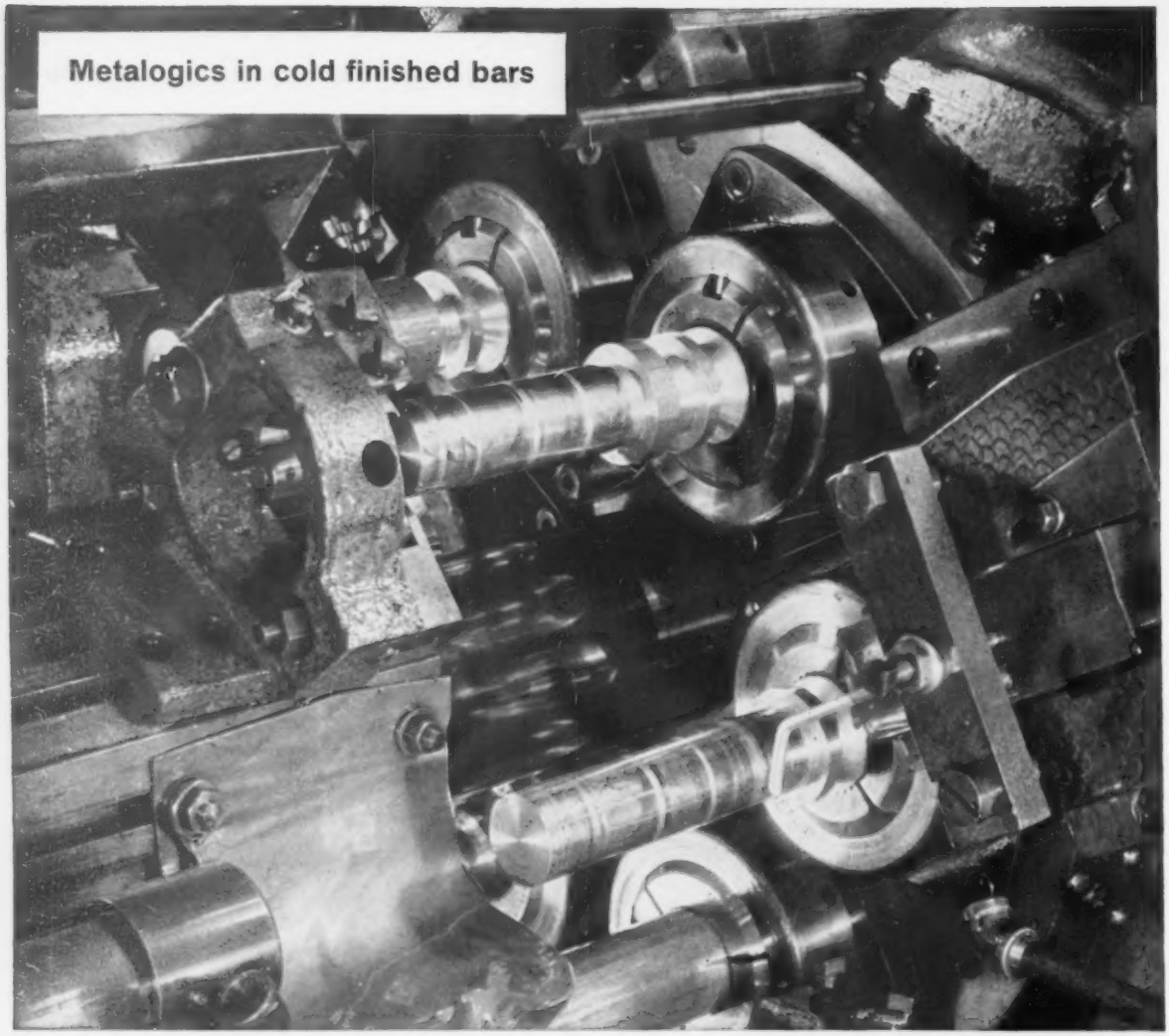
The newest overseas competitor is Compagnie des Machines Bull of France. The company has established a New York subsidiary —Bull Corp. of America—for the sole purpose of getting Bull computers and other major equipment into the U. S. market.

Now Bull is looking for another U. S. corporation with marketing facilities to push its computers.

Action on Gold Too Little, Too Late

The Eisenhower Administration's big move to cut the U. S. deficit in balance of payments is being criticized in many quarters.

The criticism is not that the move is too little, but that it is too late. Many officials, including congressmen, have been seeking some drastic action for many months.



The big difference in Ryerson cold finished bars—

consistent machinability

When you buy cold finished bars from the nation's largest supplier of steel from stock—Ryerson—you can always count on optimum machinability with dependable consistency. Setup headaches, production snarls and rejects are reduced to a minimum because the rigid quality controls of Ryerson Metalogics assure uniformity of stock from one lot to another.

In addition to this consistency, Metalogics offers you unequaled service in depth. With 118 years of steel service experience, Ryerson has helped solve every conceivable kind of machining problem. And Ryerson stocks are the nation's largest, including even the hardest-to-get types and sizes. So Ryerson specialists are able to recommend the very best steel for any given application.

For consistent optimum results . . . plus on-time delivery, be "Metalogical"—call Ryerson.

METALOGICS

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Prevent Valve Failures

Valve and fitting failures, caused by corrosion, are often mistakenly blamed on design or other mechanical factors. A new corrosion-testing service corrects this costly fallacy while boosting valve life. Samples of different alloys are attached to a special test rod. Then the rod is mounted inside the desired processing line. This allows each sample's relative resistance to be checked under actual operating conditions.

Eliminate Heat Buildup

Look for a breakthrough in aluminum technology within the next three months. It involves the elimination of speed limitations which are imposed by heat when rolling aluminum sheet. As it stands now, excessive speeds create a heat buildup that causes distortion and other problems.

Extends Die Life

Goods news for diemakers centers on a new cold-worked tool steel. This manganese-chromium-molybdenum alloy combines the deep-hardening properties of air-hardening steels with the simplicity of low-temperature heat treatment. The newcomer resists impact and shock loading. Thus, it extends die life while reducing maintenance and operating expenses.

Recovers Unused Gold

Platers take notice. A new gold-saving unit reclaims the gold from solutions that are normally washed down the drain. The unit consists of a recirculating pump and a column of special resin. It collects the precious metal from the drag-out tank by filtering the solution through the resin. When the resin becomes saturated, the gold is reclaimed by burning off the resin.

Which Way for Auto Trim?

Stainless steel producers are carefully checking new automotive specifications for trim stock. One large trim plant has specified a certain degree of brightness, but hasn't stated that bright annealing is a must. There are reports that one of the big three will write bright annealing into its specs. However, producers who are following different routes are confident the issue will be resolved on the basis of properties, rather than by the designation of a fixed process.

Barrel Finishing Method

Centrifugal force is being put to use in a barrel finishing machine to produce highly buffed surfaces on intricately contoured parts. The machine contains a number of horizontally-mounted, rubber-lined barrels on a large turret. Barrels rotate on separate axes from the main turret. This fast process can handle parts ranging from small watch screws to auto head lamps.

More Special Machining

To work the increasing volume of harder alloys, such as beryllium, molybdenum and cobalt alloys, more reliance is being placed on the newer machining processes. These include ultrasonics, electro and chemical milling, and high heat-cutting methods. Industry will profit from these developments through cheaper dies and simplified designs that reduce overall production costs.

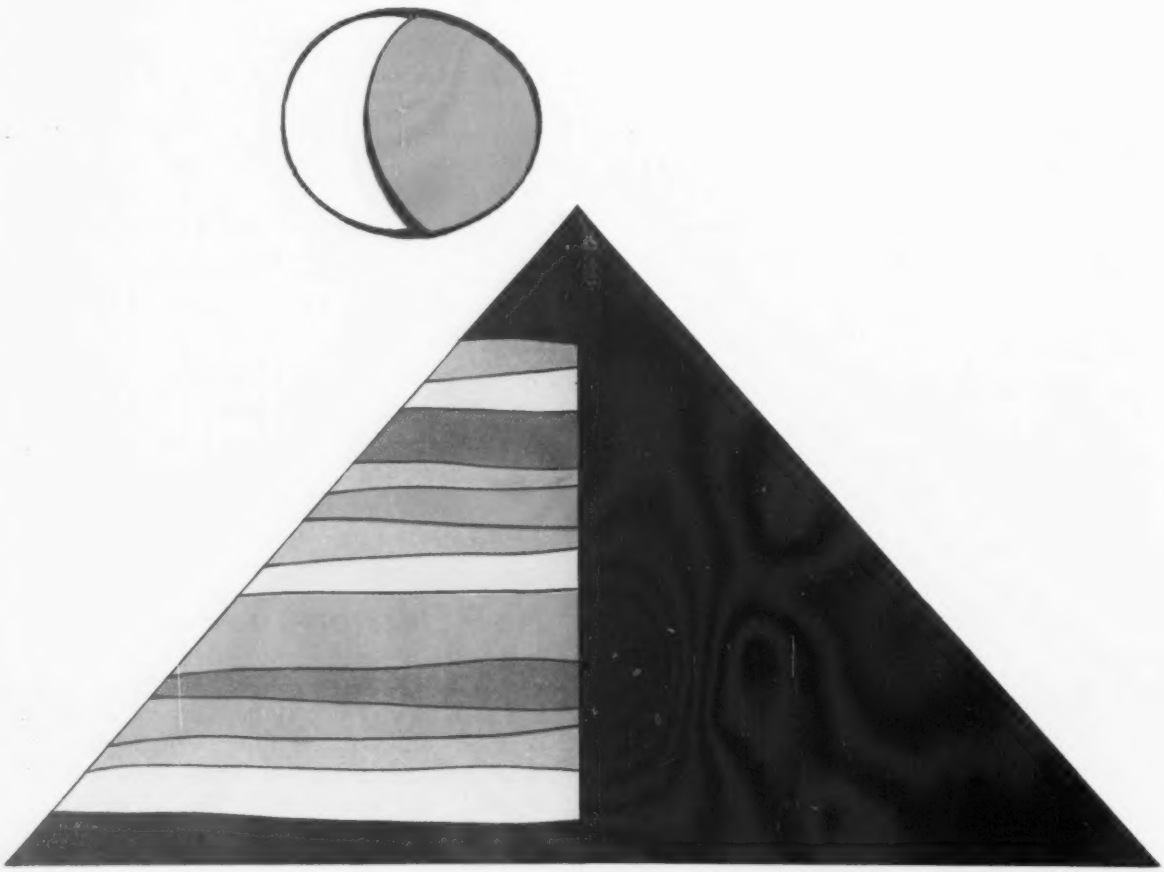
New Electron-Tube Alloys

Columbium and its Cb-0.65Zr and Cb-40Ta alloys show moderate room-temperature strengths and good ductility in both the cold-worked and annealed conditions. At 1000°C, these columbium alloys are stronger than the unalloyed metal. On the basis of its good workability, hot strength and weldability, the Cb-0.65Zr alloy promises dependable service as a high-temperature structural material for electron tubes.

Mills Want Coke Pellets

New methods of coke production are being studied. Results from ore sintering and pelletizing operations have started coke producers looking for an agglomeration method. One plan hinges on the making of coal briquettes prior to coking.

You'll put permanence into products with Western Brass because brass is tough to start with... because time, use and environmental attack only mellow it. But whether you use brass for strength or appeal, your product calls for an individual alloy, temper, gauge and finish. Count on Western Brass to recommend and produce exactly the right one. (It will even arrive in boxes specially adapted to your handling methods.) You'll make it better with durable brass. You'll make it best with "tailor-made" Western Brass.



OLIN MATHIESON • METALS DIVISION • EAST ALTON, ILL., NEW HAVEN, CONN.

Western BRASS

AF Report

Sir—On p. 15 of your Oct. 20 issue you mentioned an Air Force-sponsored research report showing the effect of vibration on casting of beryllium and aluminum. Can you advise where this report can be obtained? On the same page, you also discussed the use of pulsating gas burners on reverberatory furnaces. Can you tell us the manufacturer of this equipment?—H. P. Brueschke, Aluminum Co. of America, Detroit, Mich.

▪ **For further information about the Air Force report, contact the U. S. Dept. of Commerce, Office of Technical Services, Washington 25, D. C. More data on the item "Pulsating Gas Burners" can be obtained from the Hoover Co., Die Casting Div., 101 Maple St., North Canton, O.—Ed.**

More Information

Sir—Would you kindly send me further information on the item entitled, "Produce Pure Oxygen," which is described in your Tech-front section of the Oct. 27 issue. Also, we would appreciate receiving more data on "Ceramics-To-Metal Seals" found in the same issue on the same page.—William E. Sauter, C. I. Hayes, Inc., Cranston, R. I.

▪ **For further information about the first item, contact J. Bishop & Co., 88 King St., Malvern, Pa. For the second item, get in touch with Wilbur B. Driver Co., 1875 McCarter Hwy., Newark, N. J.—Ed.**

Detector

Sir—Your Oct. 13 issue contained an article regarding an electronic detector for inspecting used bearings. It is felt that such an instrument would produce substantial savings not only in bearing replacement costs, but also in machine downtime and repair costs. We would therefore appreciate any additional information you may have concerning this device. — William H. Yockey, Ford Motor Co., Cincinnati, O.

▪ **The source of additional information is the SKF Industries, Inc., Front St. & Erie Ave., Philadelphia 32, Pa.—Ed.**

Complete Grasp

Sir—Again I want to commend you for your complete grasp of the real and present menace of Communism as evidenced by another of your very able editorials on the subject. I refer, of course, to your editorial "Fighting Communism: Why Is It So Difficult?" which appears in the Oct. 20 issue of The IRON AGE—G. D. O'Neill, Baltimore and Ohio Railroad Co., Baltimore, Md.

For Members

Sir—Would you be kind enough to send us 250 copies of your article, "Is Leasing the Best Solution to Machine Tool Finance," by Mr. A. C. Nolte. We will mail these to our members who buy and sell metalworking machine tools.—R. K. Vinson, Machinery Dealers National Assn., Washington, D. C.

▪ **Copies will be sent.—Ed.**

Immediate Interest

Sir—In the Oct. 20 issue of The IRON AGE on p. 15, there is an item that is of immediate interest to us. We would appreciate details concerning a digital extensometer which helps to control hardness in mills that produce sheet or tinplate. —Andrew A. Sherockman, National Steel Corp., Weirton, W. Va.

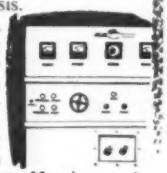
▪ **Allis - Chalmers Manufacturing Co., Industrial News Bureau, Industries Group, Milwaukee 1, Wis., will be able to supply you with the desired information.—Ed.**

MARIAN A. STACHOWIAK,
Hayes Induction Heating Engineer, reports . . .

SELECTIVE HEAT TREATING CAN BE SIMPLE . . .

when equipment and application know-how go to work

High-Frequency Induction Heating . . . standard procedure for selective hardening, melting, annealing, brazing, preheating, hot forming, sintering, and vacuum heating . . . now takes a big step forward with another Hayes development — a new high-frequency induction unit that puts selective heating on a *simple* and *economical* basis.



PUSH-BUTTON Controls are featured with this new Hayes induction heater to obtain instant and exact heat distribution at any desired surface area of a steel part. Heating and quenching cycles are *automatically controlled* and are so rapid that distortion, decarburization, and excessive oxidation are practically eliminated. Protective atmosphere systems (pioneered by Hayes) can be supplied as an integral part of the induction unit.

UNIT Design Saves Space — because heater stations and power generator are incorporated in *one* compact cubicle . . . for more output per sq. ft. of floor space. Moreover, the Hayes unit includes work handling devices which can be set up simply, integrated into your production line, and operated as easily as any other machine tool.

Safe, Easy Maintenance is another feature of Hayes' design. Easy-access panels provide plenty of working room for maintenance and adjustment of components. Safety interlock switches throughout shut off plate power when panels are opened. Write for information on Hayes new induction heating unit, work tables and accessories . . . or other "Results Guaranteed" furnaces in Hayes Certain Curtain line.

FREE BULLETIN 5910

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Established 1905

ELECTRIC CERTAIN FURNACES

It Pays To See Hayes for metallurgical guidance, lab. facilities, furnaces, atmos. generators, gas and liquid dryers.

"Global Design of Our New Constellation Vacuum Cleaner Calls for Deep-Draw Quality, Excellent-Surface J&L Steel"

. . . The Hoover Company

The two hemispheres that make up the base and cover of the Hoover Constellation cleaner are each blanked from a flat piece of steel. With a single stroke of a stamping die, The Hoover Company forms perfect shells, 6.037 inches deep, for their Constellation cleaner. Key to this stamping operation is the excellent drawing quality of J&L 22-gage sheet steel.

Despite the severity of the draw, there are no breakage problems, no die mark problems, no "orange peeling" or strain lines.

Successful production of this spherical cleaner is possible because the J&L cold rolled sheet used at Hoover has three essential qualities: (1) Consistent Drawing Quality, (2) Excellent Surface Finish, and (3) No Age-Hardening.

Mr. Ralph O. Ross, Hoover's buyer of steel, believes: "Production would be vastly complicated, if not impossible, without cold rolled, drawing-quality, killed steel sheet. We would be hindered by metal breakage during the stamping operation, and troubled by die marks and surface imperfections on the completed spheres were it not for a number of advantages of the cold rolled sheet."

To get exactly the right J&L steel for special requirements in your own plant, contact your Steel Service Center. Or, write direct to *Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.*

Steel

This Steelmark identifies products made of steel. Place this mark on your products. And—look for it when you buy.

Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

Above, left, 19-inch blanks are stamped from coils of J&L 22-gage drawing-quality cold rolled sheet steel. Flat blanks go next to a single-stroke drawing press which forms them into spherical shells.

Severe draw forms shells into 6.037 or 6.027 inch deep hemispheres with single press stroke. This operator positions flat blanks and removes stamped shells by hand. Excellent drawing quality of J&L sheet virtually eliminates breakage, strain marks, and "orange peeling" problems.

Surface finishes are examined by Chief Inspector of Finished Products, William Bauman (left), and Steel Buyer Ralph O. Ross. Quality surface finish of J&L sheet has greatly reduced number of shells "wheeled" (ground) before painting.

Final assembly is done by skilled men, each of whom puts together a complete cleaner. Each Hoover Constellation Cleaner is 100% inspected — electrically, functionally, and visually.

HOW MUCH automatic control ...and WHEN?

BAILEY 700 SYSTEMS can help you make sure . . . with step-by-step benefits

Many important — and profitable — improvements in steelmaking operations can be accomplished with analog and digital computer equipment.

Too much, too soon, however, can be costly — as can too little, too late. Intermediate stages of refinements in measurement and control are desirable and necessary. These not only can produce substantial benefits, but can demonstrate the additional improvements possible with further—or ultimately complete—automatic control. Bailey step-by-step automation assures against loss of prior investment.

Bailey engineers can help you determine optimum usage of *Bailey 700 Analog and Digital Systems* in your operations. They are equipped, by broad experience, to provide single-source responsibility from sensing and measuring instrumentation to complete automatic control. *Bailey 700 Systems* are installed, in operation, or on order, at locations from coast to coast.

Find out what this Bailey experience can offer you. Contact your Bailey District Office.

Where Bailey 700 Systems can aid steelmaking operations

SINTERING — to achieve maximum quantity and quality of output at lowest cost.

BLAST FURNACES — to provide lower coke rates and higher yields.

OPEN HEARTH — to increase production and control delays.

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PLANT UTILITIES — to reduce power and fuel consumption while still meeting plant requirements.

S122-1

IRON AND STEEL DIVISION

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National Goals

"I am hopeful that the panel will develop a broad outline of coordinated policies and programs for the next decade and longer . . . and set up a series of National Goals in various areas of national activity."

So spoke President Eisenhower early this year in thanking Dr. Henry Wriston, president, American Assembly, Columbia University, for accepting the Chairmanship of the President's Commission on National Goals.

Upcoming Problems — The bipartisan Commission was set up by the President to ponder economic, agricultural, and educational problems likely to be faced by the nation over the next two decades.

There are 11 members of the National Goals Commission. Frank Pace, former Secretary of the Army and now Chairman of the Board of General Dynamics Co. is vice chairman. The remaining members are:

James Killian, president of MIT and former White House Science Adviser; Gen. Alfred Gruenther, president of the American Red Cross and former NATO commander; Clark Kerr, president of the University of California; Learned Hand, retired Justice of the U. S. Circuit Court at New York; Erwin Canhajm, editor of the Christian Science Monitor; Colgate Darden, former governor of Virginia; James Conant, former Ambassador to the West German Republic; George Meany, president of the AFL-CIO; and Crawford Greenwalt, president of Dupont.

Special Analysis—This week the Commission filed its report to the President. Next week The IRON AGE will present an analysis of those areas of the report which have a direct bearing on metalworking: Economic growth and organization; technological change and science; foreign economic policy; and the next ten years.

The Commission's overall report will have been based on, but not necessarily in agreement with, reports from panel members expert in these fields. In succeeding weeks The IRON AGE will bring you an analysis of these reports in its new series on National Goals.

Skirts vs. Business

One of the pages that we like best, and one which gets our most careful attention, is Business Forecast, which appears as Metalworking Newsfront 1 each week on p. 7.

One of our principal sources of news for this page is in contributions sent in each week by our far-flung news bureaus and also from staff members at all levels.

Short Items—As you can imagine, editing this page is a deadly serious job. You can also imagine our surprise when, in going through our staff contributions, we came across this item:

"Look back many years and you will find that there is a close relation, statistically, that is, between length of skirts and the business outlook. Now, skirts are getting shorter and shorter.

"This leading indicator could mean we are on our way out of recession soon, and into a real boom. The sidewalk dope seems to be that in poor times, more material is used and in good times, or in the early period of good times, less material is used.

Wait and See—"Our textile business gazer says it works something like this: Business is bad, so less material is used. But the new style sells the dresses, more money is made per dress. This, he says, coincides with the so-called corrective period with the short skirts leading the way as an indicator."

We don't know whether it's cricket to identify the contributor, but Editor-in-Chief Tom Campbell stands by it, says wait and see.

CAR HEARTH FURNACES

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HEAT TREATING
STRESS RELIEVING
ANNEALING
HOMOGENIZING
600°F TO 2500°F

DIRECT FIRED OR FORCED CONVECTION, OIL, GAS, ELECTRIC

R-S CAR HEARTH FURNACES are batch type furnaces with movable hearth for ease of loading and unloading. They can be designed to your specifications as direct fired units for temperature range from 1000° to 2500°F. or as forced convection units from 600° to 1600°F.

R-S CAR HEARTH FURNACES can be built to utilize oil, gas or electricity, whichever is the most economical for your plant. Whatever the charge weight, length or width required R-S engineers can design and build the furnace to meet your requirements most efficiently.

R-S CAR HEARTH FURNACES have proved themselves throughout the world. In foundries for heat treatment of steel and iron castings. In metal working plants for stress relief of weldments, annealing, normalizing, spherodizing and forging, or to heat for rolling, forming, or forging.

For full details on R-S Car Hearth Furnaces write to...

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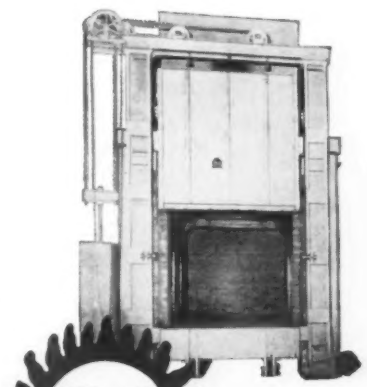
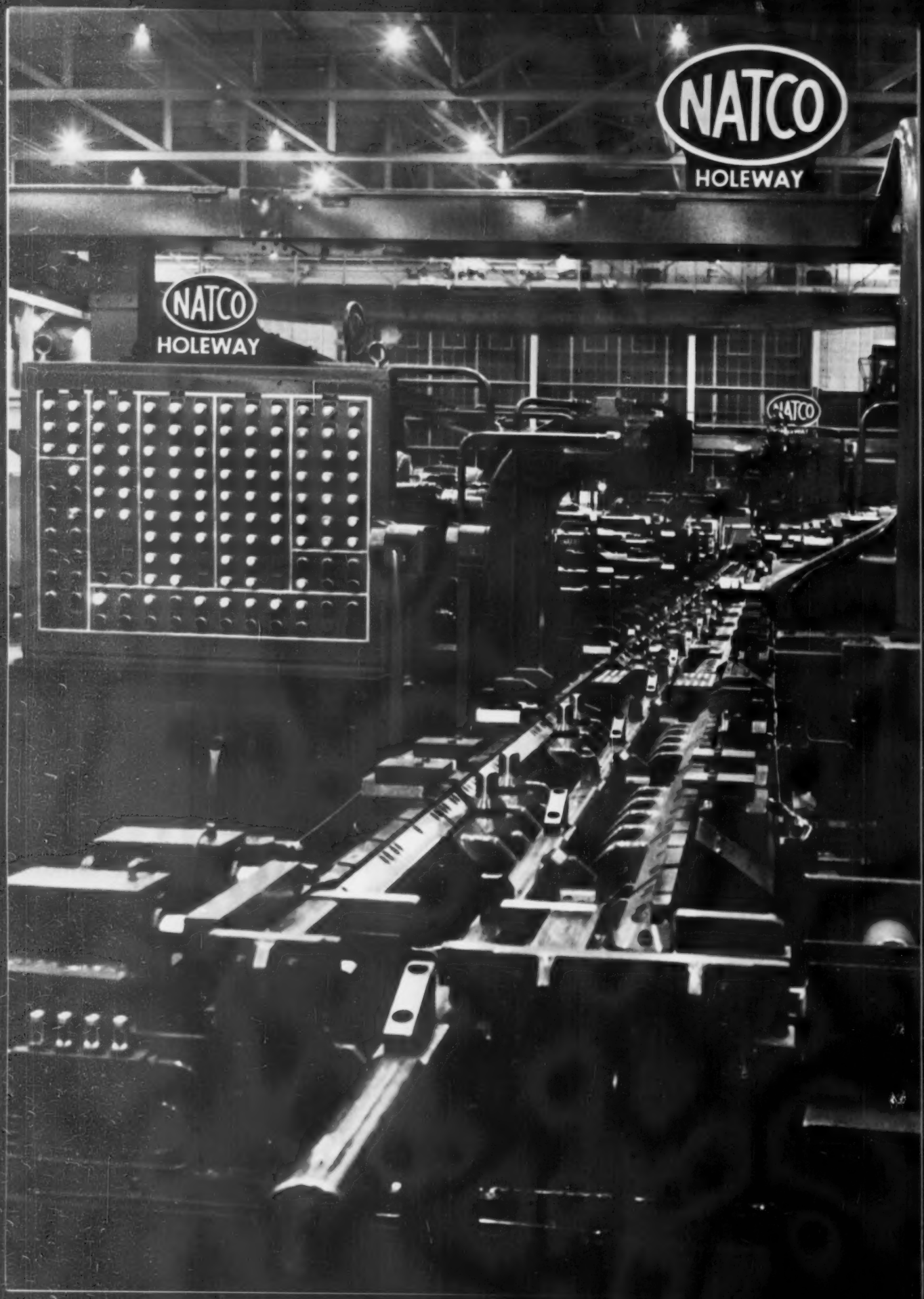
NORTH WALES, PA.



R-S FURNACES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Machining sequence is straight line, controlled from a single station, with pallet return conveyor.

Compact Machining for Compact Cars

Quality, quantity, and convenience in minimum space mark this Natco Holeway, built for machining steering knuckles for one of tomorrow's compact cars. It's a pallet-type machine, and once right and left hand knuckles are clamped in the pallet, there's no rehandling through 48 separate machining operations (plus many probing, cleaning, and orienting operations).

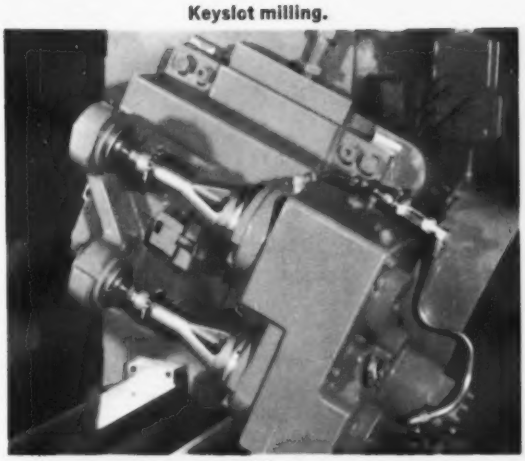
Building block construction accommodates 18 separate stations in one tight package, and will save tremendously in lead time and rebuilding costs when it comes time for model changeover. The machining operations include drilling, tapping, deburring, taper reaming, face milling, chamfering, straight reaming, threading, and keyway milling. Production rate? 100 parts an hour.

Whether you manufacture parts for compact cars or trucks, Natco has a way to machine them better. Call your Natco representative for facts.

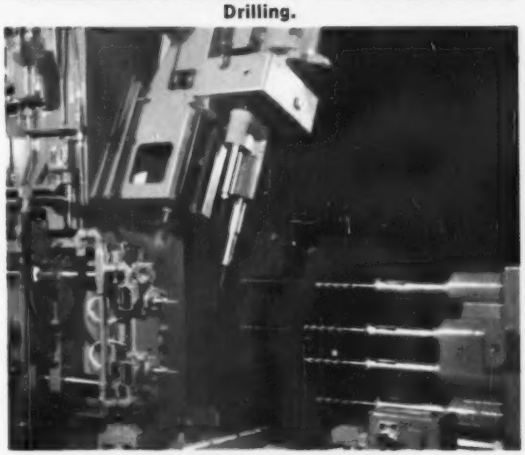
NATCO

The National Automatic Tool Company, Inc., Richmond, Indiana

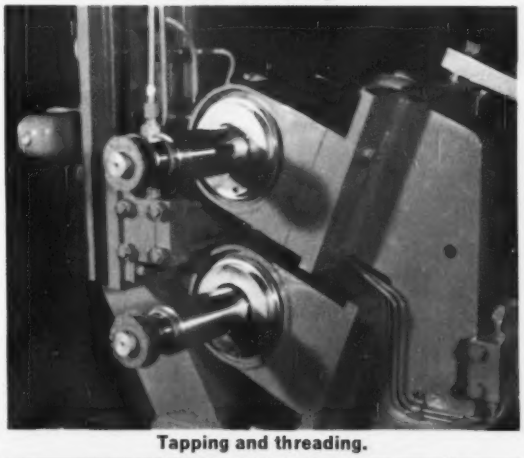
Keyslot milling.



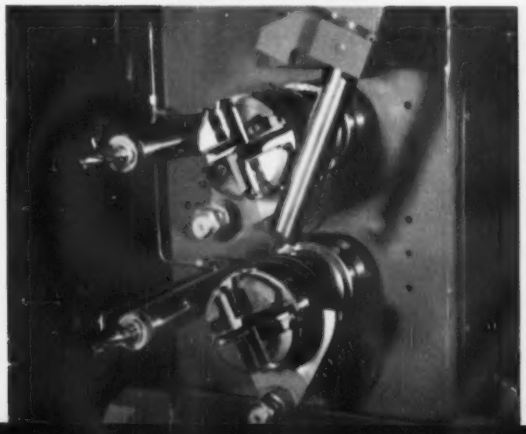
Drilling.



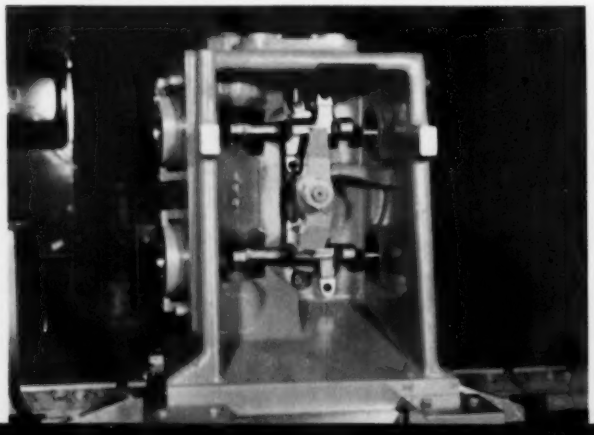
Brush deburring.

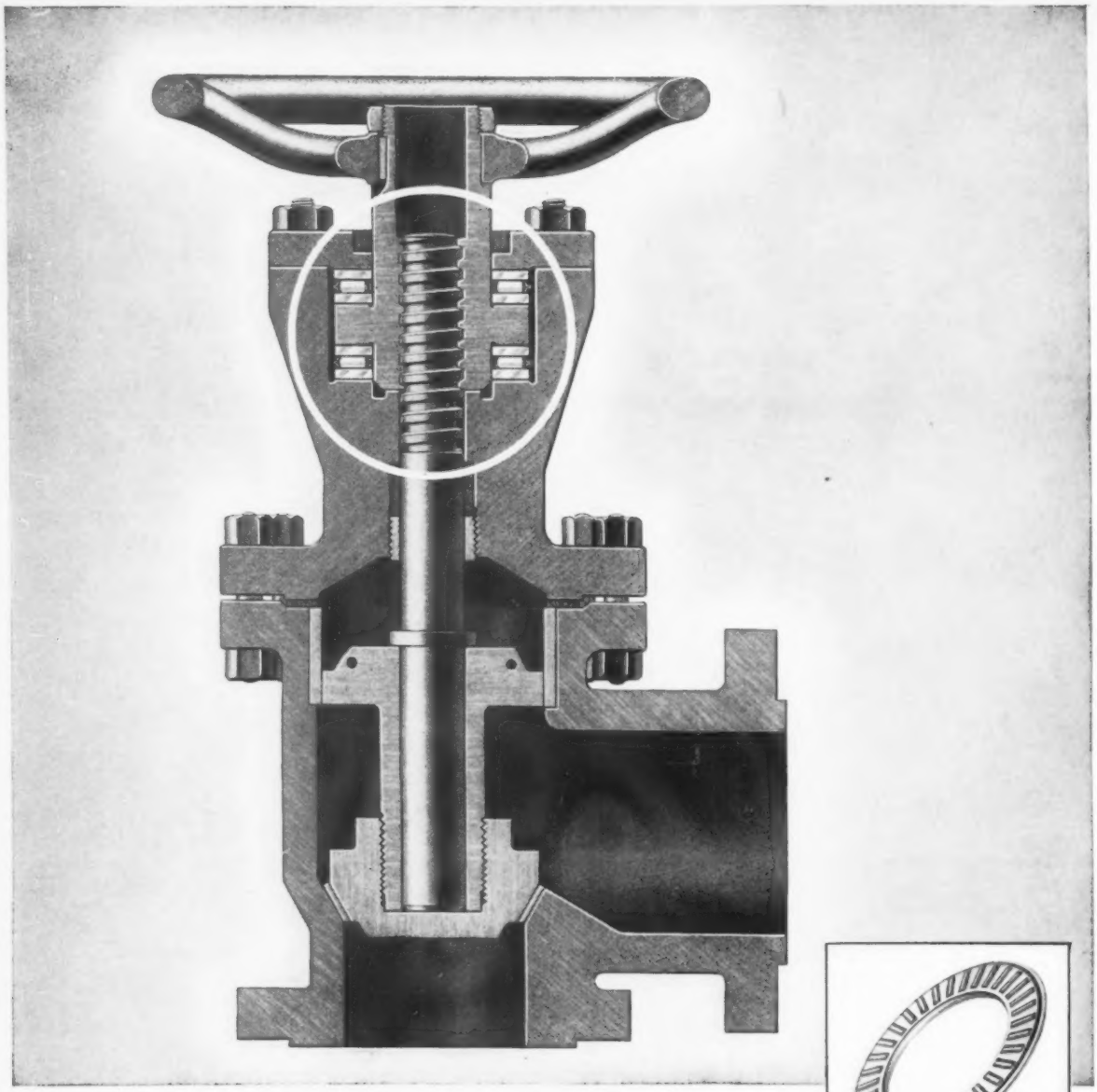


Tapping and threading.



Pallet holds right and left-hand steering knuckles.





Compact valve design, easier operation with Torrington Needle Thrust Bearings

High thrust capacity, thin cross section and low unit cost have made Torrington Needle Thrust Bearings a natural choice for top valve performance. With Torrington Needle Thrust Bearings, only a fraction of the normal closing effort is needed. This puts less strain on the valve... means smoother, more reliable operation. Lifetime pregreasing insures peak efficiency over years of extra service life.

Torrington Needle Thrust Bearings are exceptionally compact. They provide an assembled height far less than any other type of thrust bearing. They may be run directly on adjacent hardened and ground surfaces, or, as shown above, on standard Torrington thrust races.

If you make gate valves, globe valves, angle valves—in fact, any valve closed on a threaded stem—you'll find it pays to investigate the top efficiency of Torrington Needle Thrust Bearings. Call or write Torrington—maker of every basic type of anti-friction bearing.

Torrington Needle Thrust Bearing

Torrington Thrust Race

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY Torrington, Conn. • South Bend 21, Indiana

COMING EXHIBITS

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. (International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show—March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

Plant Maintenance & Engineering Show — Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

DECEMBER

American Institute of Chemical Engineers—Annual meeting, Dec. 4-7, Statler Hotel, Washington, D. C. Institute headquarters, 25 W. 45th St., New York.

American Mining Congress—Annual membership meeting, Dec. 5, Plaza Hotel, New York. Headquarters, 1200 18th St., N. W., Washington, D. C.

The Electric Overhead Crane Institute—Annual meeting, Dec. 6, Carlton House, Pittsburgh. Institute headquarters, One Thomas Circle, Washington 5, D. C.

JANUARY

The Institute of Scrap Iron & Steel, Inc.—Annual convention, Jan. 8-11, Hotels Fontainebleau and Eden Roc, Miami Beach, Fla. Institute headquarters, 1729 H St., N. W., Washington 6, D. C.

Aluminum Window Mfrs. Assn.—Annual meeting, Jan. 9-12, Emerald Beach Hotel, Nassau, Bahamas, Association headquarters, 630 Third Ave., New York.

(Continued on P. 28)

Let's Join Hands

Count on your Clemson Star distributor as the "helping hand" for service. Especially, when you have a tough metal cutting problem. He's an old hand at solving them and has at his beck and call, the Clemson engineering facilities. He knows the Clemson Star line of hand and power hack saws, band saws, hole saws and files. And, he can be helpful when it comes to matching the right Clemson Star product to fit the job.

Look to him to help you keep costs down and increase production and to supply the top quality Clemson Star products you need to do the job.

Ask him for your free wall chart and metal cutting manual or write us.

CLEMSON STAR

Manufactured by CLEMSON BROS., INC.
Middletown, N. Y.

Here you see 4 among the hundreds on the world's largest staff of aluminum fabricating specialists . . .

GUS HOGLUND—Welding

Twenty years ago, Gus Hoglund gathered a dozen skeptics around a jar of flux, a torch and some bits of aluminum. He was breaking trail for the man who now brazes 350 percolator spouts an hour . . . and for the company that will crack a new market with welded aluminum cans, churned out at 500 a minute.

Even when doubting Thomases granted you could weld aluminum, they had to be taught how to do it. Gus Hoglund and his Process Development crew gave lessons by the thousands. And their work between classes with alloys and techniques has led to the development of welded aluminum structures three times as strong as the best of the past.

WALT SICHA—Castings

If the fathers of today's foundrymen had looked at the blueprints for this aluminum impeller, they'd have said, "Impossible!" Neither alloys nor casting techniques of a generation ago could satisfy production demands of such intricate shapes.

Then along came inquisitive researcher Walt Sicha. Over the years Walt and his staff of 70 found about two dozen alloys that make today's casting possible. What's more, Walt says that if none of these fits your requirements, give him and his specialists some time and they'll find another that does. Because these men played pioneer roles in casting aluminum by every known method—sand, die, plaster and permanent mold—their counsel carries the stamp of authority and reliability.

WHICH OF THESE MEN CAN LEND YOU A HAND?

Welding, casting, forging, impacting . . . Alcoa fabricates aluminum by almost every metal-working technique. Hundreds of men like Hoglund, Sicha, Ziegler and Gauthier can, therefore, be completely objective in recommending the method most appropriate to your needs. Help like this is unique in the aluminum industry and it means there's more than just 16 ounces of metal in every pound of Alcoa® Aluminum you buy. You're well on the way to realizing this added value when you call your local Alcoa sales office. Aluminum Company of America, 2018-M Alcoa Building, Pittsburgh 19, Pa.

MARK ZIEGLER — Impacts

The modern impact is a far cry from the simple forms Alcoa introduced back in 1920. Today you can slip an aluminum slug into an impact press, trip the hammer, and quick as a wink bang out a ribbed flashlight case, gleaming coffee maker or sleek missile body.

With more than 20 years' experience in this major metalworking technique, technical manager Mark Ziegler can help your engineers design impacts that equal far costlier machined pieces in detail, strength, finish and tolerances. The state of the art is such, Mark will tell you, that today's impacts can be round, rectangular or polygonal in form, and as small as a thimble or a foot in diameter and four feet long.

TOM GAUTHIER — Forgings

When Tom Gauthier probes the innards of a forging with 2¼, 10 or 25 million sound waves per second, no flaw can remain undiscovered. His ultrasonic inspection is our customers' insurance against any imperfection that might turn up to ruin heavy investments in machining.

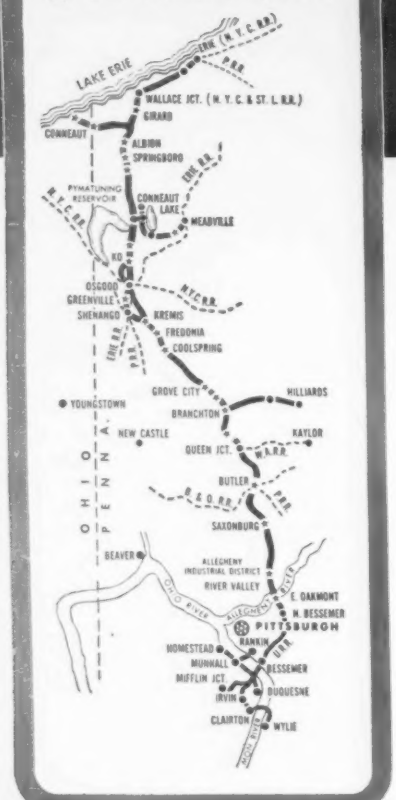
Chief metallurgist at Alcoa's Cleveland Works, Tom will go to any length to check the integrity of a forging. The piece he is shown with, for example, is a cross section of an aluminum aircraft wheel. The curious zebra stripes were produced as part of a study of grain flow. To Tom's trained eye they tell whether the tough aluminum grain will provide a wide margin of safety under shock loads and cyclic fatigue.

ALCOA ALUMINUM

HELPS YOU DESIGN IT, MAKE IT, SELL IT

another Bessemer location advantage

★ SUITABLE SITES



The Bessemer Area is one of the world's greatest industrial markets with a $5-billion primary and fabricated metal output. Reach out 125 miles—and you tap a lucrative market of over 8 million consumers.

Other Bessemer Area advantages are: 24-hour delivery of steel and other basic materials; extensive deposits of coal, limestone, clay and aggregates; a labor force of over a million widely diversified as to skill; choice of unexcelled, adaptable, flood-free sites served by abundant water, gas and power.

Investigate today! Write or phone for location factors on any of the suitable plant sites indicated by stars on the map. No obligation. Strictly confidential.

BESSEMER and LAKE ERIE RAILROAD CO.

INDUSTRIAL DEVELOPMENT DEPARTMENT

1830 FRICK BUILDING • PITTSBURGH 30, PA. • ATLANTIC 1-4780

The Bessemer Man is at your "Site Service"

MEETINGS

(Continued from P. 25)

Society of Automotive Engineers, Inc.—Annual meeting, Jan. 9-13, Cobo Hall and Convention Arena, Detroit. Society headquarters, 485 Lexington Ave., New York, N. Y

Hoist Manufacturers Assn., Inc.—Annual meeting, Jan. 10, Statler Hotel, Cleveland. Association headquarters, One Thomas Circle, Washington.

Steel Shipping Container Institute, Inc.—Winter meeting, Jan. 17-18, St. Regis Hotel, New York. Institute headquarters, 600 Fifth Ave., New York.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 18-20, Logo Mar Hotel, Fort Lauderdale, Fla. Association headquarters, 105 W. Madison St., Chicago.

Industrial Heating Equipment Assn., Inc.—Annual winter meeting, Jan. 23-24, Dearborn, Mich. Association headquarters, 2000 K St., N. W., Washington, D. C.

Instrument Society of America—Annual meeting, Jan. 23-25, Hotel Astor, New York. Society headquarters, 313—6th Ave., Pittsburgh.

Society of Plastic Engineers, Inc.—Annual technical meeting, Jan. 24-27, Shoreham & Park Sheraton, Washington, D. C. Society headquarters, 65 Prospect St., Stamford, Conn.

Cutting Tool Manufacturers Assn.—Annual business meeting, Jan. 26, Harmonie Club, Detroit. Association headquarters, 1216 Penobscot Bldg., Detroit.

National Assn. of Secondary Material Industries, Inc.—Midwestern Div. regional meeting, Jan. 26, Statler-Hilton Hotel, Detroit. Association headquarters, 271 Madison Ave., New York.

Truck-Trailer Manufacturers Assn., Inc.—Annual convention, Jan. 29-Feb. 1, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, 710 Albee Bldg., Washington, D. C.

"KEYSTONE WIRE made this part possible" at International Screw Company

flowability IS THE SECRET

International Screw Company, Detroit, Michigan, manufactures a special weld stud fastener for one of the 1961 automobile models. The combination large head, deep collar and weld points required unusual flowability.

This weld stud now is formed in an extreme double blow with no head or collar cracking. Keystone Cold Heading Wire fills the dies completely giving sharp, clean edges . . . long die life and trouble-free production runs. Of this, W. C. Nelson, President of International Screw says, "Keystone Wire made heading this part possible."

Here is another case where Keystone Cold Heading Wire and its flowability characteristics solved a difficult forming problem. May we suggest you, too, try Keystone Wire for difficult cold heading jobs, and for ordinary ones, too!

A Keystone Wire Specialist will gladly discuss your wire forming problems with you and make recommendations. Call him at an early date and let him show you how Keystone Flowability can help you, too.

Keystone Steel and Wire Company, Peoria, Illinois

KEYSTONE

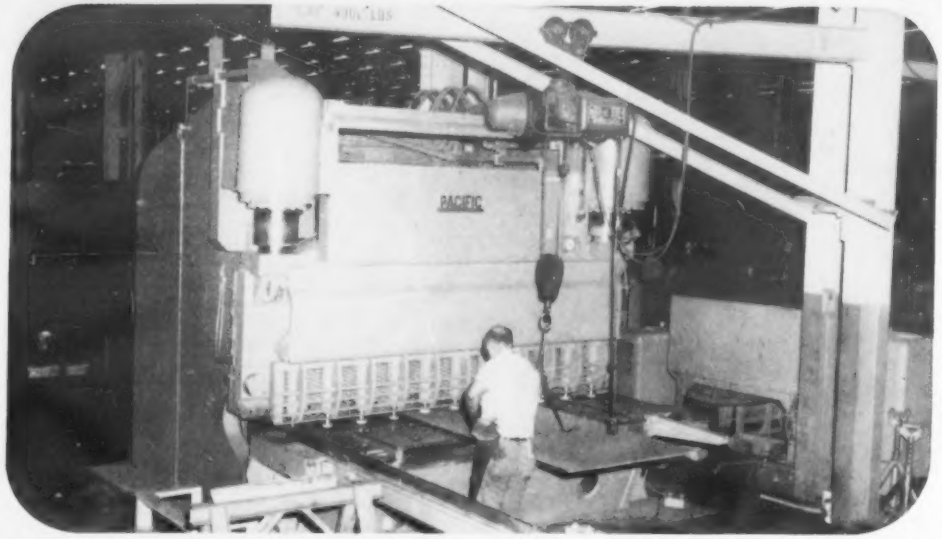
WIRE FOR INDUSTRY

MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.

CUT CONTROL ENABLES PACIFIC HYDRAULIC SHEAR TO DO JOBS IMPOSSIBLE ON ANY OTHER SHEAR!

PACIFIC *Cut Control* is a group of adjustments permitting all controls to be set at the optimum value for perfect shearing of each different job: light gauge, heavy plate, polished stainless, soft aluminum, brittle alloys, long narrow strips, high speed cycling for high production, extreme accuracy for precision work. Unlike conventional shears limited in shearing ability by permanent settings without possible adjustment, PACIFIC can be controlled to fit the job exactly. No longer is it necessary to compromise with quality because the shear cannot be adjusted.

- **Adjustable holddowns** eliminate marking of soft polished sheets.
- **Holddowns move down independently of knife** to insure exact alignment of plate before cutting.
- **Adjustable knife clearance** for light gauge shearing with heavy plate shear. Eliminates rough secondary shear fracture in heavy shearing.
- **Rake angle adjustment** for minimum twist or bow in cutting narrow strips.
- **Cushioned shearing** plus rake angle adjustment enable brittle alloys to be cut.
- **Depth of stroke** readily adjustable for slitting.
- **Adjustable cycling speed** so machine speed can be set to match operator's ability to feed plate.
- **Non-wedging back gauge lift** to prevent wedging of narrow strips being cut.
- **Rapid, precision powered back gauges.**



Heavy plate shear cuts light material with minimum bow and twist

Adjustable rake angle enables a single PACIFIC hydraulic shear to cut both heavy plate and narrow strips of light gauge material with minimum bow and twist at Caterpillar Tractor Co., Joliet, Illinois. By a simple 1-minute adjustment, the rake of this massive 1½" shear can be set to the most efficient cutting angle for any thickness of material. With similarly rapid adjustment of the knife clearance, this largest adjustable rake shear ever built cuts a complete range of metals from light sheet to 1" plate to an accuracy of .030" over the entire 10 ft. bed length. Shorter pieces over 1" thick are cut to .125" accuracy. Shockless, hydraulic pressure extends knife life and permits operation of shear on ordinary, low cost concrete pads.

Heavy duty shear for continuous mill type service

Safe—the only shear that can be stopped instantly in emergency and is protected against overload

3 to 8 times longer knife life than mechanical shears

Noiseless operation—quieter than a sewing machine

Insignificant maintenance—all moving parts run in filtered oil and are protected against overload

Hundreds of dollars saved in foundation cost

Proven design—over 100 PACIFIC Shears in operation up to 5 years.

PACIFIC PRESSES AND SHEARS

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WESTINGHOUSE PRODAC BOSSES NEW 53" BLOOMING MILL

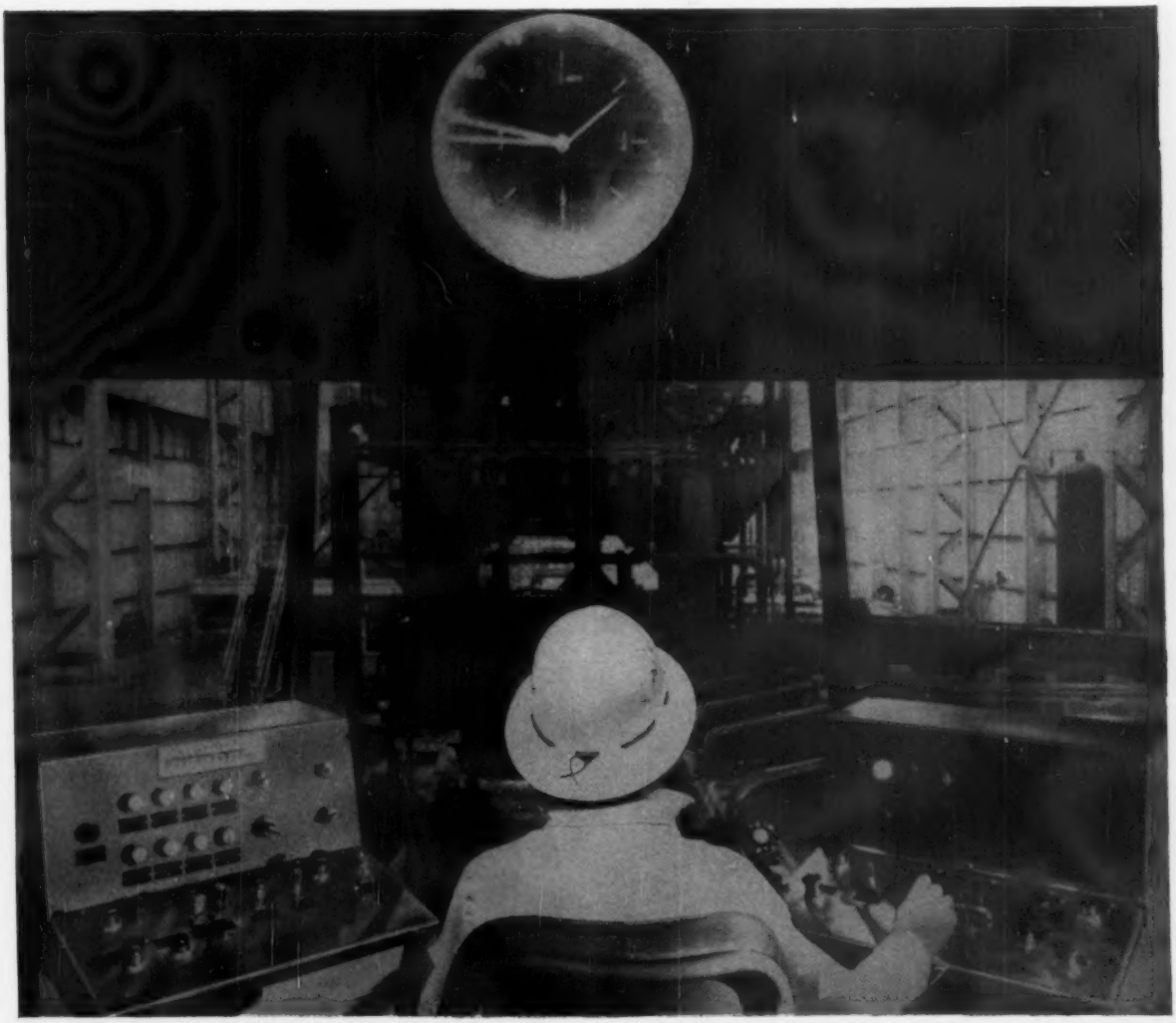
Punched cards whip through a reader . . . and the new 53" blooming and slabbing mill at U.S. Steel's South Works automatically squeezes 20-ton white-hot ingots into blooms. Bossing the complete operation: Westinghouse PRODAC* control, the first fully automatic control applied to a blooming and slabbing mill.

PRODAC control is one way U.S. Steel is tackling the challenge of increasing productivity. PRODAC slashes time delays between passes, utilizes full mill capacity, and eliminates human error to assure consistent, efficient operation.

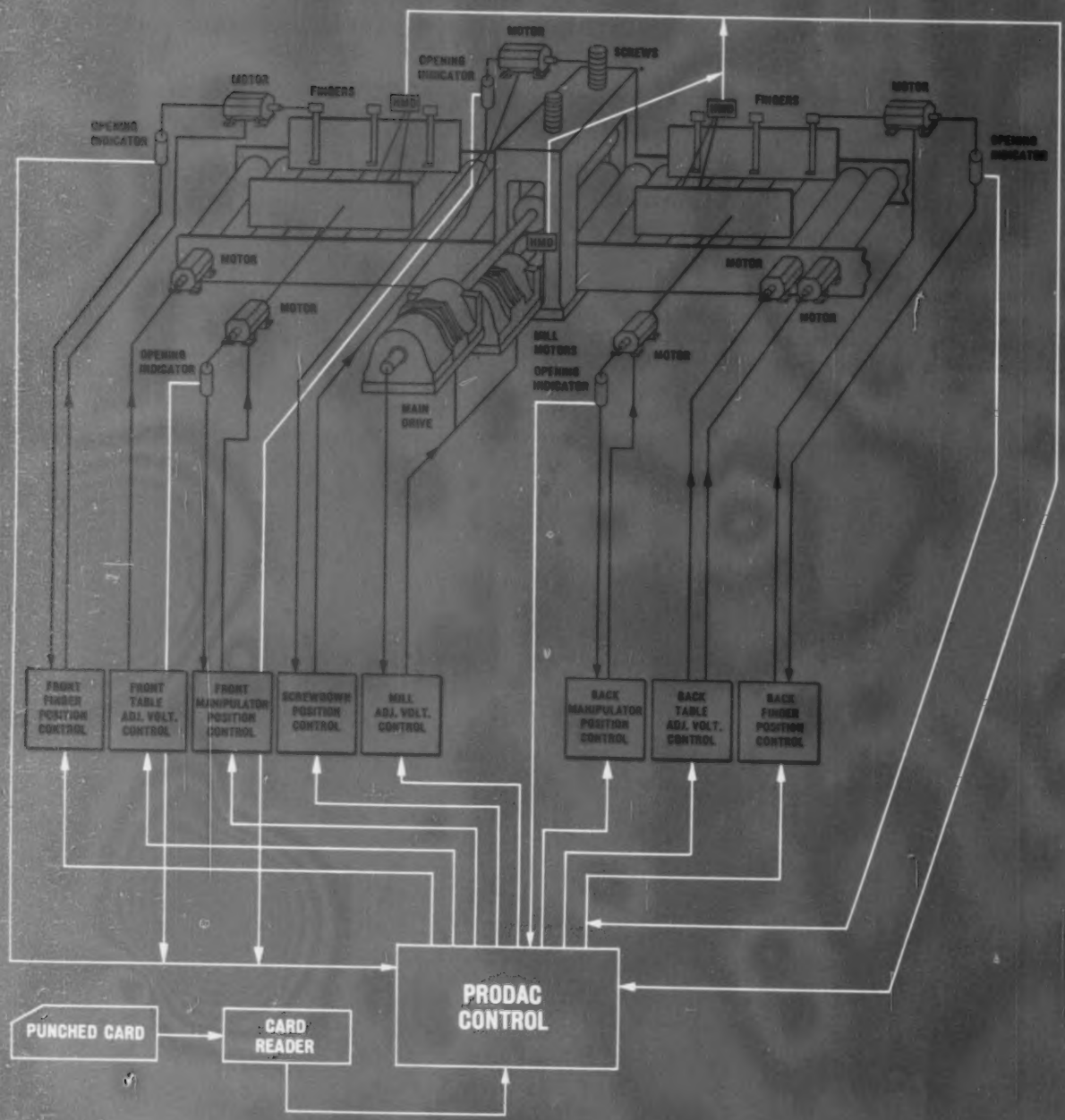
Turn the page and you'll learn exactly how PRODAC goes about bossing the mill. *Trade-Mark J-96155

STRADDLING THE MILL TABLES is pulpit from which operator monitors mill performance. Compact desks containing unique, miniaturized controls may be operated manually if necessary. Card reader is accessible to operator for new schedules.

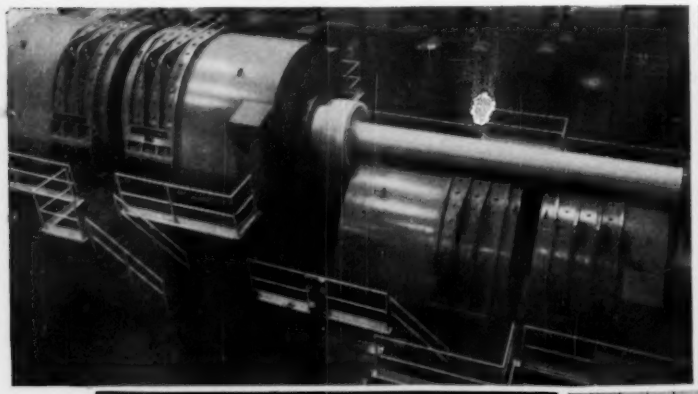
Westinghouse



53" BLOOMING AND SLABBING MILL

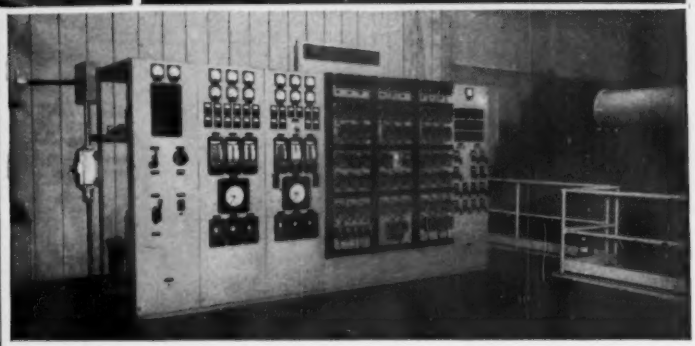


MILL MUSCLES are dependable Westinghouse motors. Here is the 12,000-hp, 40/80-rpm twin drive (foreground) with 10,000-kw flywheel m-g set.



MILL BRAIN is PRODAC control system, housed in compact cabinet, which automatically operates mill by duplicating manual actions on a predetermined sequence.

PRODAC
COMMANDS
ALL
MILL OPERATIONS
. . . EVEN
INGOT TURN



THE MAIN DRIVE CONTROL features rugged steel panel construction.

PRODAC directs U.S. Steel's new blooming and slabbing mill from only three punched cards. They contain all operating information needed to execute a rolling schedule of as many as 29 passes. As shown on the diagram opposite, the cards are fed into a card reader by the operator and the data is stored in PRODAC's memory. The operator hits a button . . . PRODAC takes over.

FOR EACH PASS, PRODAC uses the proper stored data to send signals to appropriate control elements. Main drive entry speeds, acceleration and deceleration rates are precisely regulated. Screwdown openings are positioned to a final accuracy band of $\pm 1/32''$ over a 60″ opening range, while sideguards are positioned to $\pm 1/2''$ accuracy band over a 120″ range.

At PRODAC's direction, manipulator fingers turn the ingot by lifting to any of seven heights. Mill feed rolls and tables match their speed to the main drive and, on direction, adjust themselves to a present draft compensation. PRODAC control also provides for tandem rolling during early passes.

WHEN A PASS IS COMPLETED, hot metal detectors report the ingot ready for the next pass, and PRODAC sets up the mill. One schedule can be repeated for successive ingots or, for a different schedule, the operator inserts new cards and lets PRODAC carry on.

J-96155-3

Westinghouse

WHEN PRODAC SIGNALS, WESTINGHOUSE MILL DRIVES RESPOND INSTANTLY

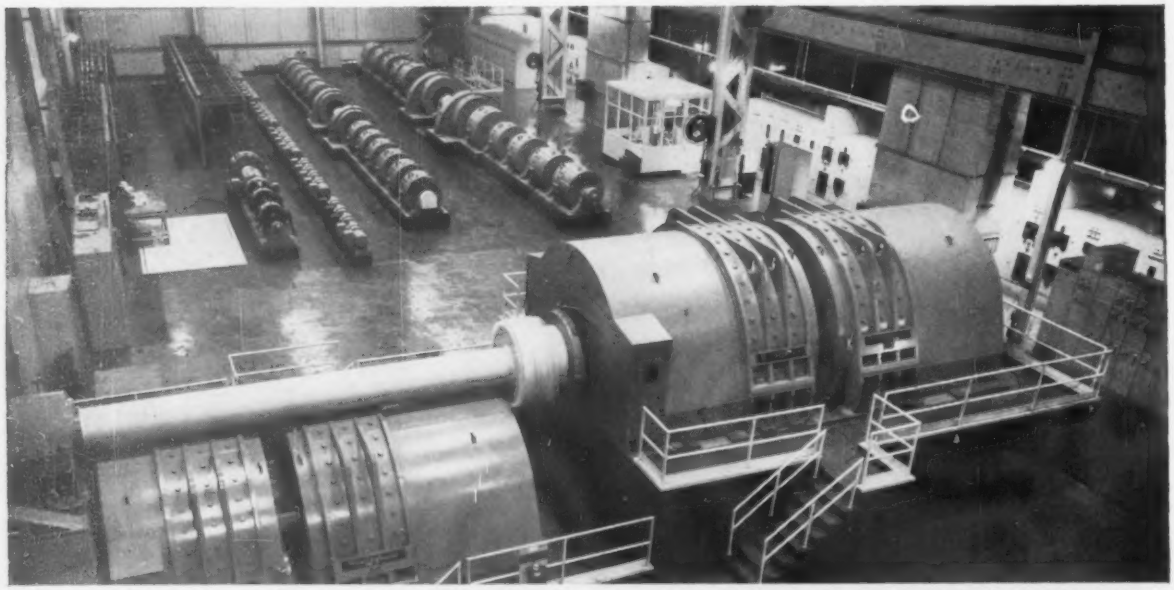
The Westinghouse drive system and related power equipment share the spotlight with PRODAC in the successful automation of U.S. Steel's blooming and slabbing mill.

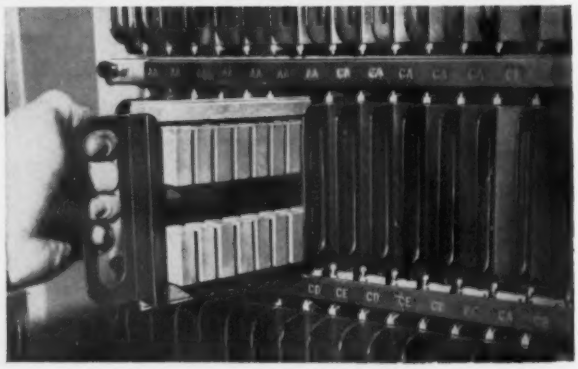
The 12,000-hp main mill drive consists of two 6000-hp double armature twin motors. The screwdown, manipulators, fingers, and front and back table and feed rolls each have Westinghouse adjustable voltage drives complete with Magamp regulators. Complete engineering and coordination of these drives assure the instantaneous response to PRODAC's commands critical to keeping the mill on schedule.

PRODAC control like that for U.S. Steel is a key element in Westinghouse *Progressive Automation*. This new concept aims at helping steel producers boost product quality and quantity through economical, step-by-step automation. Your Westinghouse representative has details on *Progressive Automation* . . . and PRODAC. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. *You can be sure . . . if it's Westinghouse.* J-96155-1-4

Westinghouse

12,000-HP MAIN MILL DRIVE (foreground) with auxiliary m-g sets and exciters (upper). **THE FIRST ALL-STEEL PANEL** construction is utilized in this variable voltage auxiliary control (lower left). **SINCE THE INSTALLATION** of the mill, the PRODAC module, representing a circuit function, has been refined. The new module is shown below and is easily accessible for removal or replacement (lower right).





When predictable performance is imperative . . .

COPPER TUBE

HUSSEY COPPER AND BRASS TUBING & PIPE

Copper All Purpose Tube

Copper Water Tube (Types K, L, M)

Copper Refrigeration Tube (Dehydrated and Sealed Ends)

Copper Pipe

Brass Tube (also square, rectangular, hexagon)

Red Brass Pipe

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

There is no substitute for a material with proven service characteristics. Consider these unique advantages of COPPER TUBE: *conductivity* . . . highest heat transfer of all commercial metals; *durability* . . . unequalled corrosion resistance, even in underground installations; *flexibility* . . . forms readily to any design, regardless of complexity.

Hussey Copper Tube is available in a full range of sizes, tempers and wall thicknesses—all quality controlled to meet your most critical needs.

COPPER HUSSEY BRASS

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A reindeer brings you Season's Greetings when you write to

SANTA CLAUS

(specialist in world peace)

A Field Engineer brings you profitable ideas when you write to *LINCOLN*

(specialists in arc welding)

WRITING to Santa Claus is an exciting experience for the whole family. Eager faces . . . pencilled lists . . . crackling fire . . . and the air alive with expectancy. And then the long, almost unending wait until Christmas, when miraculously St. Nick generally delivers even a little more than was desired. This is why we have faith in him. That's the spirit of Christmas!

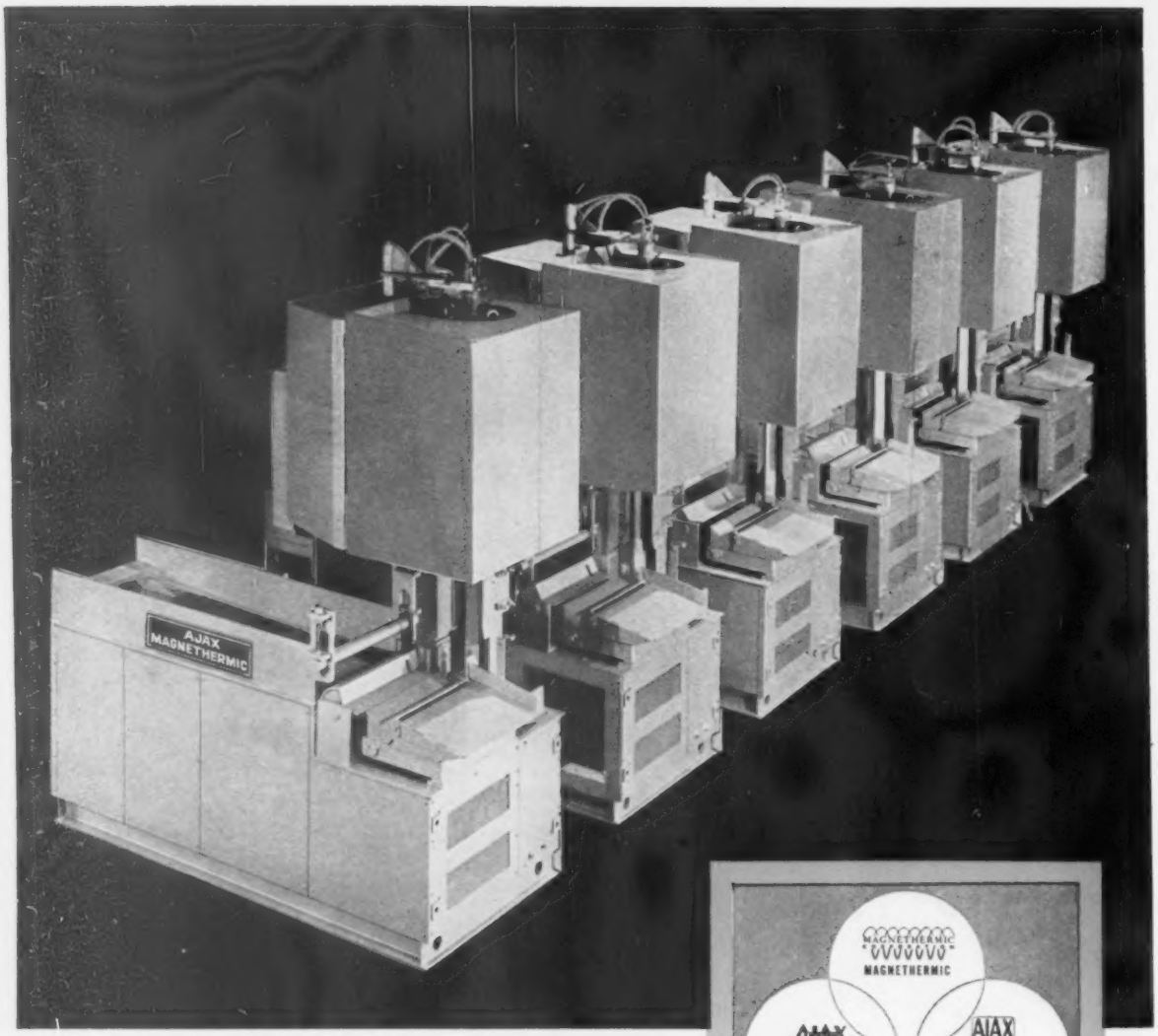
Now, we don't say our Field Engineers will arrive in sleighs filled with toys, but this we can guarantee: if you write a letter to LINCOLN, the Field Engineer who calls will be able to give you a good deal more help than you expected. Not only does he know welding products but also the best procedure to use on each job. He understands how to relate welding profitably to your total manufacturing operation.

That's why so many companies who have had faith in LINCOLN for over fifty years say, "It's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a 'plus' at no charge."

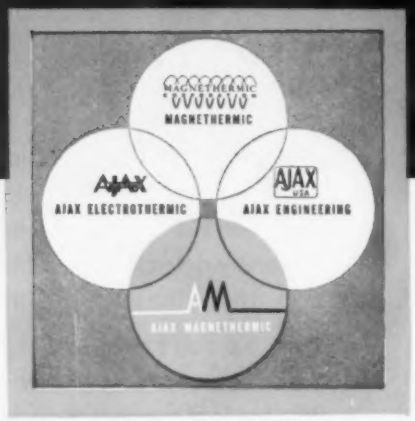
Merry Christmas!

THE LINCOLN ELECTRIC COMPANY
Dept. 1960 • Cleveland 17, Ohio

LINCOLN WELDERS



These six 400 KW vertical Billet Heaters heat stainless steel billets—5" —10" dia. x 28" long, to 2300° F at the rate of 12,000 lbs. per hour.



WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

Vertical Steel Billet Heaters, one of many products of AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

AJAX Magnethermic CORPORATION

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Youngstown 1, Ohio

TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

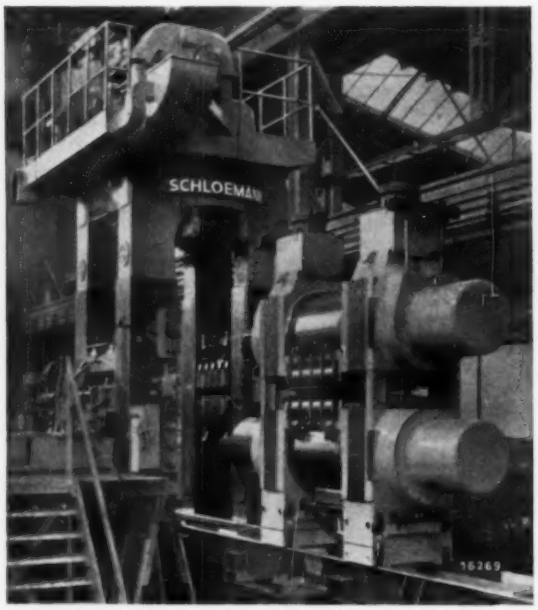
YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

UDC 621.944.9

SCHLOEMANN
ROLLING MILLS · HAMMERS · PRESSES

Multi-purpose rolling mill for "refractory" materials

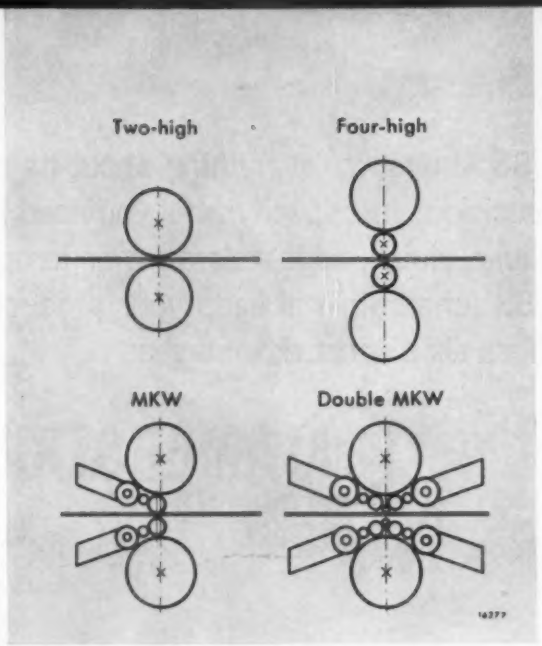
Special alloys for the nuclear power and other industries have presented extraordinary problems. The new MKW mill (US and foreign patents) developed by SCHLOEMANN is ideally suited for rolling these refractory materials and is readily adaptable



MKW 80 during workshop assembly. Above, the double MKW set-up is seen in run-out position; below, the view from the entry side shows the pay-off reel and coiler.

for conventional rolling work. Typical characteristics as included in the specifications of an MKW mill recently built for operation in the United States are as follows:

Hot and cold rolling – Initial thickness up to 2" Final thickness of strip – .006" standard; .001" min. Rolling force – in excess of 2200 tons at 24" strip width (twice the roll separating force required for rolling of conventional CrNi steels).



Four different roll set-ups for one mill:

Two-high set-up: 36" ∅ rolls

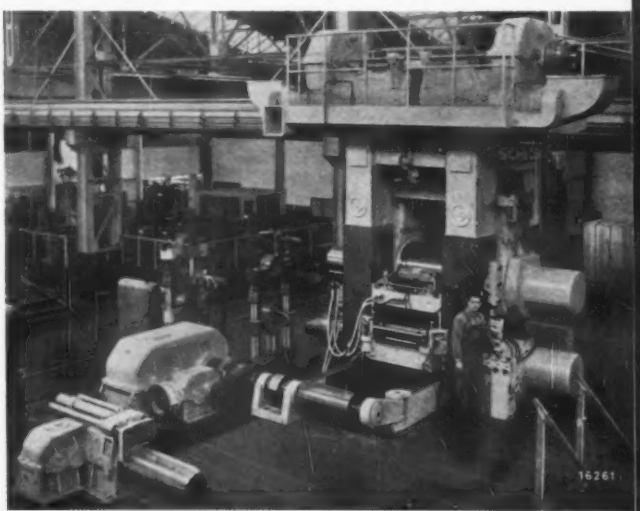
Four-high set-up: 16½" ∅ driven work rolls

MKW set-up: 36" ∅ driven back-up rolls, 5" to 5½" ∅ work rolls

Double MKW set-up: 36" ∅ driven back-up rolls, 2" to 2¼" ∅ work rolls

Wide working range

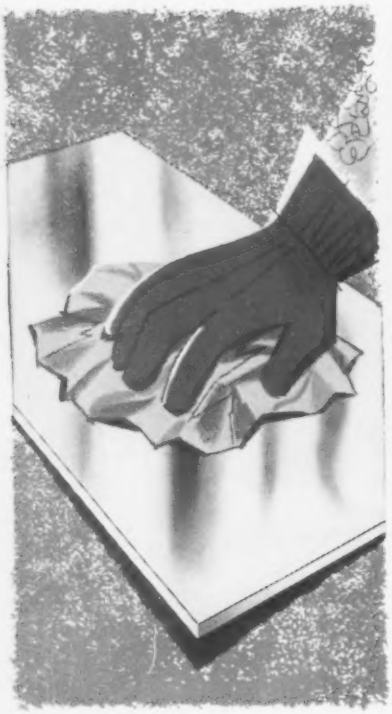
The mill is equipped with four different roll set-ups and is thus provided with an extremely wide working range. Since the new super high-grade but difficult-to-work materials are currently required in comparatively small quantities only, the use of one MKW mill with four different roll set-ups offers practical and economical advantages.



FELLER ENGINEERING COMPANY 1190 Empire Building, Pittsburgh 22, Pa.

USS Amerstrip—everything about its method of manufacture has the stamp of precision. Just specify what you need in a cold rolled strip, whether it's a precise gauge, finish, edge, tolerance or temper and you get exactly what you specify. USS Amerstrip will keep your product quality high and consistent because of these six distinct advantages:

USS AMERSTRIP GIVES YOU PRECISELY



PRECISION FINISH

With USS Amerstrip we take special pains to give you a finish that is just right for the specific results you require in a finished product. We believe the Amerstrip finish is the finest you can get in the industry.

PRECISELY PREPARED EDGES

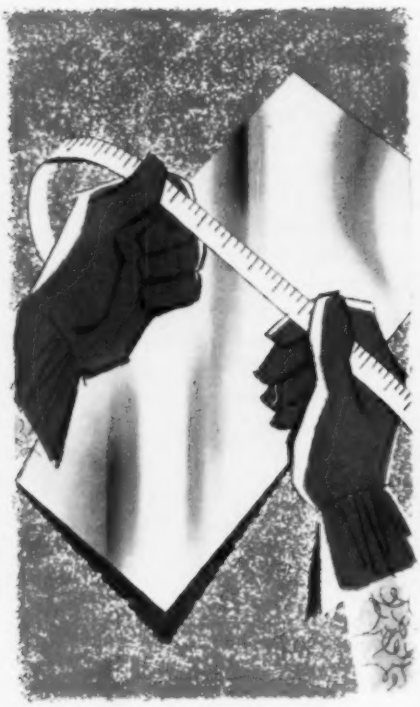
Because USS Amerstrip is produced in order-sized quantities engineered to your own specifications, we can give you precisely the edge finish you need. Choose your edge—square, standard, round, full round or bevel.

PRECISE TEMPERS

Whether your product must go through a deep draw or undergo other stringent forming operations, or if it requires a special temper for rigidity, you'll always get the correct temper for the job when you order USS Amerstrip.

Watch United States Steel's special Christmas show, **The Coming of Christ**, in Color on NBC-TV, Wednesday, December 21, 8:30 P.M., E.S.T.

WHAT YOU NEED IN A COLD ROLLED STRIP



PRECISE WIDTH TOLERANCES

When your fabricating machines require a special width strip, you can be sure that's the width you'll get with Amerstrip. We can produce USS Amerstrip within required tolerance limits to fit your special requirements.

PRECISE THICKNESS TOLERANCES

Whatever thickness tolerance your machines demand, you'll get it in Amerstrip. And it'll be precisely the same in every inch of Amerstrip ordered. Amerstrip can be rolled in thickness tolerances of plus or minus .0005 inches.

PRECISE UNIFORMITY

Regardless of the size of your order, every coil of USS Amerstrip comes off the line uniform in finish, temper, width and thickness. In short, USS Amerstrip's precision production assures a continuous run and high yield.

American Steel & Wire Representatives have the training and experience to give you expert guidance in fabrication and application of USS Amerstrip. They can show you how it contributes to a better finished product. To avail yourself of their services, call your nearest AS&W District Office. American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Amerstrip are registered trademarks

American Steel & Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
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NEW ROCHELLE THERMATOOL CORP.

THERMATOOL

HIGH FREQUENCY EQUIPMENT FOR INDUSTRIAL PROCESSING:—
RESISTANCE, INDUCTION, AND DIELECTRIC HEATING APPLICATIONS

more

THE PENALTY OF LEADERSHIP

IN EVERY field of human endeavor, he that is first must perpetually live in the white light of publicity. ¶ Whether the leadership be vested in a man or in a manufactured product, emulation and envy are ever at work. ¶ In art, in literature, in music, in industry, the reward and the punishment are always the same. ¶ The reward is widespread recognition; the punishment, fierce denial and detraction. ¶ When a man's work becomes a standard for the whole world, it also becomes a target for the shafts of the envious few. ¶ If his work be merely mediocre, he will be left severely alone—if he achieve a masterpiece, it will set a million tongues a wagging. ¶ Jealousy does not protrude its forked tongue at the artist who produces a commonplace painting. ¶ Whatsoever you write, or paint, or play, or sing, or build, no one will strive to surpass or to slander you, unless your work be stamped with the seal of genius. ¶ Long, long after a great work or a good work has been done, those who are disappointed or envious continue to cry out that it cannot be done. ¶ Spiteful little voices in the domain of art were raised against our own Whistler as a mountebank, long after the big world had acclaimed him its greatest artistic genius. ¶ Multitudes flocked to Bayreuth to worship at the musical shrine of Wagner, while the little group of those whom he had dethroned and displaced argued angrily that he was no musician at all. ¶ The little world continued to protest that Fulton could never build a steamboat, while the big world flocked to the river banks to see his boat steam by. ¶ The leader is assailed because he is a leader, and the effort to equal him is merely added proof of that leadership. ¶ Failing to equal or to excel, the follower seeks to depreciate and to destroy—but only confirms once more the superiority of that which he strives to supplant. ¶ There is nothing new in this. ¶ It is as old as the world and as old as the human passions—envy, fear, greed, ambition, and the desire to surpass. ¶ And it all avails nothing. If the leader truly leads, he remains—the leader. ¶ Master-poet, master-painter, master-workman, each in his turn is assailed, and each holds his laurels through the ages. ¶ That which is good or great makes itself known, no matter how loud the clamor of denial. ¶ That which deserves to live—lives.

This text appeared as an advertisement in the Saturday Evening Post, January 2nd, in the year 1915. *Copyright, Cadillac Motor Car Company.*

REPRINTED BY NEW ROCHELLE THERMATOOL CORPORATION
BY SPECIAL PERMISSION OF CADILLAC MOTOR CAR COMPANY

pioneer and leader
in high frequency electrical processes

than 100 installations throughout the world tells the story of

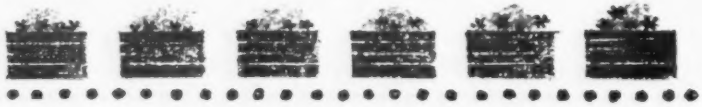
* experience * know-how * patent processes * integrity

***RE-ORDERS** FROM LEADING COMPANIES PROVE:—*
THERMATOOL USERS ARE SATISFIED USERS

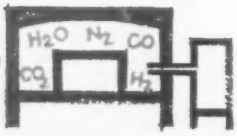
NEW ROCHELLE THERMATOOL CORPORATION
320 MAIN STREET • NEW ROCHELLE • NEW YORK

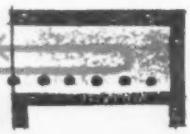
IF you want to HEAT metal....

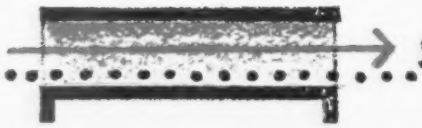
(melting, forging, brazing, sintering or treating)....ferrous, nonferrous or exotic....whether your parts travel one at a time **in batches**

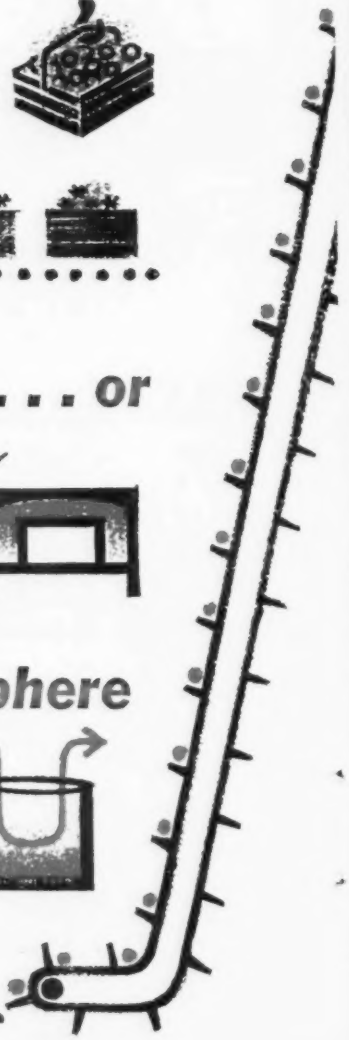
or in droves 

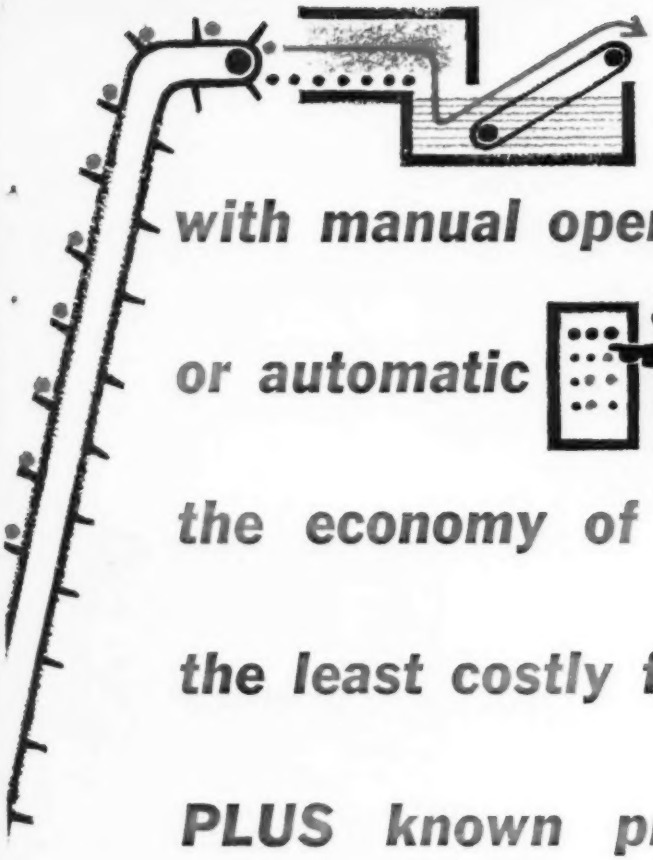
in a straight air atmosphere....or in a protective atmosphere

or 

an upgrading atmosphere in & out...  **down & up**

straight through 



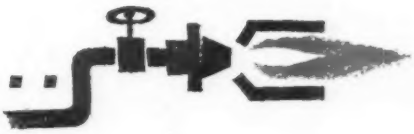


or in a combination

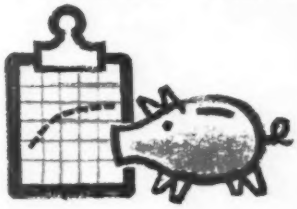
with manual operation

or automatic AND if you want

the economy of standard equipment

the least costly fuels . . . 

PLUS known production rates and

pre-rated operating costs 

WHAT DO YOU NEED? (pit, pot, box, link, muffle, tube, snap or lab furnace)

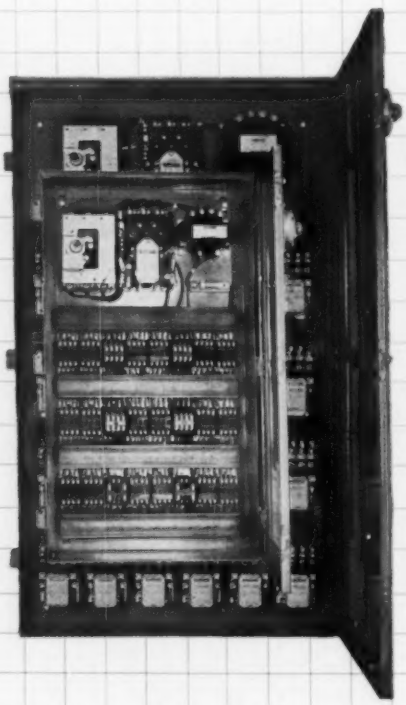
. . . SURFACE MAKES IT!

Write for Bulletin SC-175. Surface Combustion, 2373 Dorr St., Toledo 1, Ohio.
In Canada: Surface Industrial Furnaces Ltd., Toronto, Ontario.

A division of Midland-Ross Corporation M-R

Surface®

This new Westinghouse BF relay . . .



saves inches here . . .

This new Westinghouse BF relay is small and can be butted one against the other so that your control panels can be reduced in size as much as 50%. Result: valuable plant floor space available for additional machines. Because the relay is specifically designed for automated machine tools, you cut installed costs more than 20%. And since this relay is in stock, you get these savings NOW.

feet here . . .

Want more information on the 6-amp, 300-volt BF and its companion, the 10-amp, 600-volt AF? Contact your nearest Westinghouse representative . . . or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. J-30321-R

You can be sure...if it's **Westinghouse**

V-R

CREATING THE METALS THAT SHAPE THE FUTURE

Modern equipment assures precise shape and sizes

No single method can produce all the sizes and shapes of carbides manufactured at V-R. That is why five different pressing methods are used to meet industry's needs. The press shown here is typical of the modern, precision equipment used to compact carbide at V-R. Regardless of the method used, accurate controls and the knowledge gained through long experience enable V-R to form carbide to exact dimensional requirements and proper density for the very finest cutting tool materials.

WRITE FOR A COMPLETE CATALOG OF V-R QUALITY PRODUCTS OR CALL YOUR V-R MAN.

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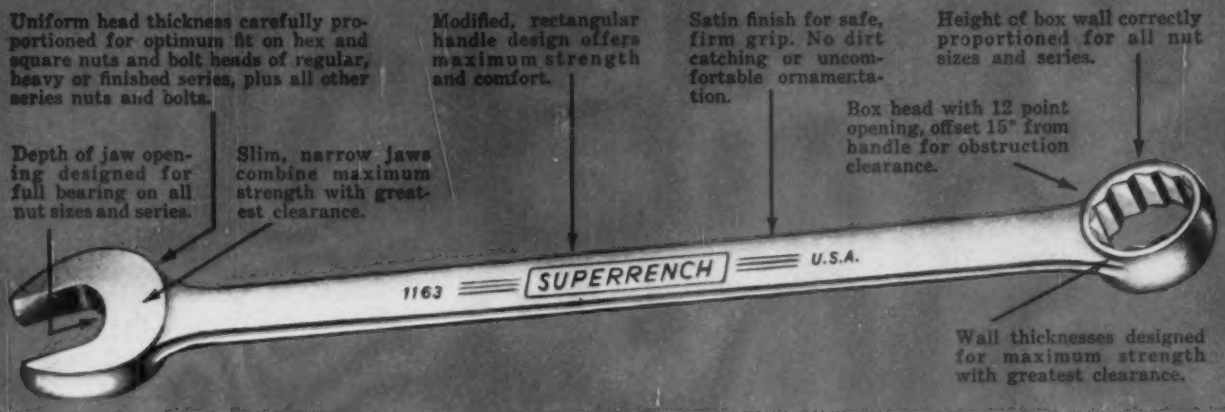
840 MARKET STREET • WAUKEGAN, ILLINOIS

C-810

WILLIAMS WRENCHES measure longer than Industry Average for extra leverage.

Both ends permit nut rotation in 30°.


Uniform head thickness carefully proportioned for optimum fit on hex and square nuts and bolt heads of regular, heavy or finished series, plus all other series nuts and bolts.
Modified, rectangular handle design offers maximum strength and comfort.
Satin finish for safe, firm grip. No dirt catching or uncomfortable ornamentation.
Height of box wall correctly proportioned for all nut sizes and series.
Box head with 12 point opening, offset 15° from handle for obstruction clearance.
Depth of jaw opening designed for full bearing on all nut sizes and series.
Slim, narrow jaws combine maximum strength with greatest clearance.
1163
SUPERRENCH
U.S.A.
Wall thicknesses designed for maximum strength with greatest clearance.

You need both... QUALITY DESIGN QUALITY MANUFACTURE

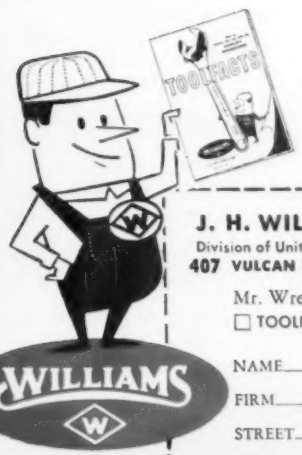
IT'S A PUSH BUTTON WORLD AT WILLIAMS
This three station transfer machine drills, broaches and chamfers box openings to close Williams' tolerances.

Open-end heads are broached to extremely close tolerances on this two station vertical ram machine.

You get the most for your money when you buy WILLIAMS!

You get the most for your money when you buy any tool, wrench or stock forging from Williams' broad line of 4530 stock catalog items.

THE BROADEST LINE OF ITS KIND



MR. WRENCH SAYS: "Get the Facts ... get TOOLFACTS ... new 24 page booklet on how to select, use and care for Quality Wrenches."

J. H. WILLIAMS & CO.
Division of United-Greenfield Corporation
407 VULCAN STREET, BUFFALO 7, N.Y.

Mr. Wrench: Please send me your new
☐ TOOLFACTS Booklet ☐ ILLUSTRATED CATALOG No. 304

NAME_____ TITLE_____
FIRM_____
STREET_____
CITY_____ ZONE_____ STATE_____

The primer that's fit to be tied

Paint a wire, dry it, tie it in a knot.

Not a crack, chip or flake if you do the job with Glidden NU-PON primer. Conclusive proof that tough, flexible NU-PON is the finest foundation for product finishing.

Glidden primers and product finishes are formulated to provide exactly the right protection against any set of conditions—corrosion, humidity, staining, impact, abrasion, heat, cold.

Your Glidden salesman can give you full information on the best Glidden finishing system for your particular product or products.

QUALITY Glidden PRODUCTS

FINISHES FOR EVERY PRODUCT

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900 Union Commerce Building • Cleveland 14, Ohio
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No matter what your product, process or problem, Glidden Finishes plus Glidden Technical Service can provide the answer.

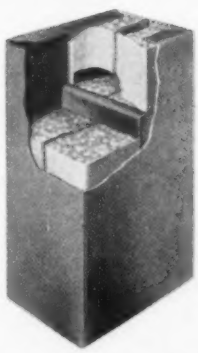
A Progress Report on an important invention

H-W METALKASE REFRACTORIES

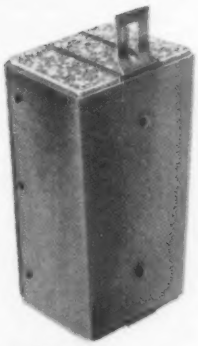
Initiated and continually advanced through numerous modifications by Harbison-Walker, these refractories contribute greatly to many noteworthy metallurgical developments.

Among all basic refractories, metalkase brick have superior spalling resistance. The metal casing and plating improve stress relief and appreciably reduce any peeling tendency.

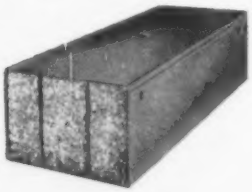
Metalkase brick are furnished in various sizes and shapes. They are made in both chemically-bonded and hard-fired basic refractories of various compositions which are used with particular benefit in suspended roofs and in walls in steel and nonferrous metallurgical furnaces.



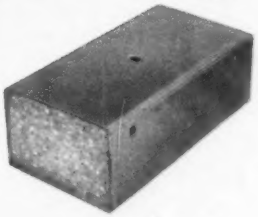
METALKASE SUSPENDED ROOF ASSEMBLY. This composite basic brick roof shape is made with both hard-fired and chemically-bonded basic brick with interior plates—ready for use as received. Suspending member is inserted, turned through 90 degrees becoming automatically locked. Important benefits result from the prefired refractory in some applications.



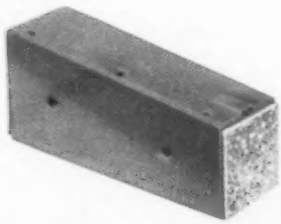
TABKASE MAGNEX OHR XXP brick externally and internally plated have a stainless steel tab welded inside the insert which is flat with the end as shipped. At the place of use, they are bent to the upright position and hung back-to-back in place. This innovation in design contributes materially to long service and notable economy in parts of open hearth steel furnaces.



METALKASE XXP are chemically-bonded basic brick formed under high pressure with two internal plates. They are available in various compositions and are furnished in standard sizes and suspended arch and other shapes. METALKASE MAGNEX OHR most widely used in open hearth steel furnace roofs continues establishing unit roof life records. The high purity magnesia produced by Harbison-Walker from Michigan brines and stabilized as dense periclase is an important constituent which measurably enhances the desirable properties of this refractory.



METALKASE BRICK (externally plated), both hard-burned and chemically-bonded in various compositions, are made with either three or four-sided steel casings. Used for many parts of open hearth steel furnaces, for sidewalls and door jambs of electric furnaces and in other applications requiring high spalling resistance in basic composition, they very satisfactorily withstand extremely severe conditions.



EXKASE basic roof brick are made with patented four-sided welded cases provided with a bendable projection which insures proper expansion allowance. This automatic means of accurate expansion allowance avoids the need of burn-out spacers. With EXKASE, furnished in various key sizes for roofs, installation is simpler and costs less.

Other designs of metalkase include special shapes for patching, unusually large sizes, rotary kiln arch and wedge blocks, various suspended arch shapes and many others.

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES — **GENERAL OFFICES: PITTSBURGH 22, PA.**

World's Most Complete Refractories Service

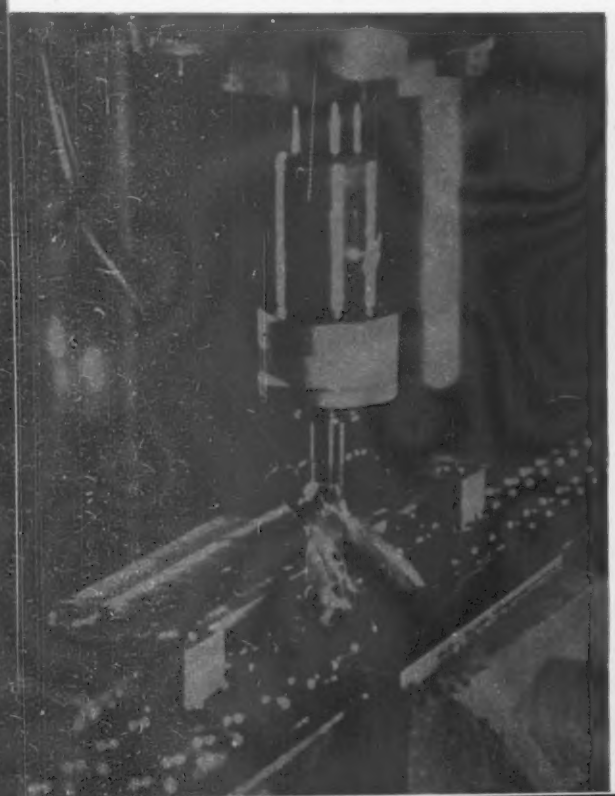
HW 60-24

Announcing a major advance

Mobilmet Oils

the first multi-metal cutting fluids...
with unique pressure-temperature selective activity.

This Tapping Efficiency Tester is one of many Mobil research tools used in the development of cutting fluids such as Mobilmet . . . effectively evaluates the machining efficiency of cutting oils on soft, draggy SAE 1020 steel. On this difficult machining operation as well as in field service, Mobilmet oils have demonstrated results better than conventional cutting fluids intended for this application. Other applications for new Mobilmet oils include: Turning, Drilling, Boring, Milling, Gear Hobbing, Shaping and Shaving, Threading, Tapping, Pipe Threading, Surface and Internal Broaching, Thread and Form Grinding, Thread Rolling, Forming and Special Automatic Screw Machine Operations.



in cutting-oil technology...

Now... from Mobil Research... versatile new cutting fluids that offer you: • greater machine output • lower tool costs • reduced loss from rejects... over wide ranges of metals and operations!

Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive composition, developed and patented by Mobil, which is *pressure-temperature selective* in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, Mobilmet oils are useful for both tough, draggy metals and hard, brittle metals.

Call your Mobil Representative, or use the coupon below.

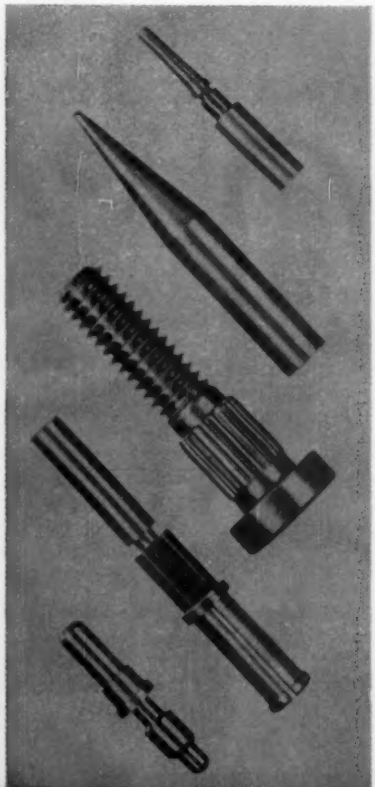
Mobil

*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

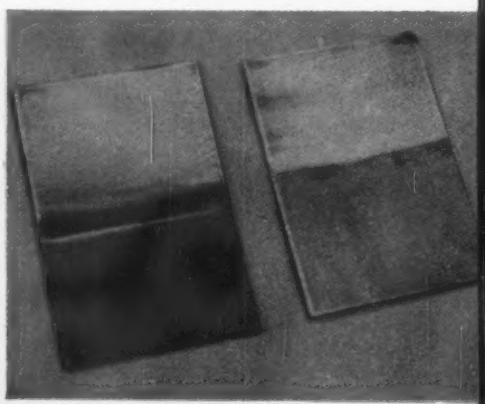
MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

Mobilmet oils offer superior tool life on both soft, draggy metals and hard, clean-cutting materials. These pipe threading chasers used for six weeks in moderately severe job-shop service show little wear on either tool faces or thread crests. Results were achieved with heavy-duty Mobilmet oil.

Since they effectively control built-up edge and tool wear, Mobilmet oils provide superior finishes that meet exacting specifications—with fewer rejects, and in some cases reduced necessity for additional finishing operations.



Stain-inhibiting effect of new additive combination is demonstrated with two steel plates. Plate on the left was immersed in conventional corrosive cutting oil; plate on the right was immersed in heavy-duty Mobilmet grade intended for the same application. Re-polished tops of plates show original condition.



Mobil Oil Company, Room 2057-C
A Division of Socony Mobil Oil Company, Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how Mobilmet oils can improve metal-cutting operations at my plant. Contact me about setting up an evaluation program.

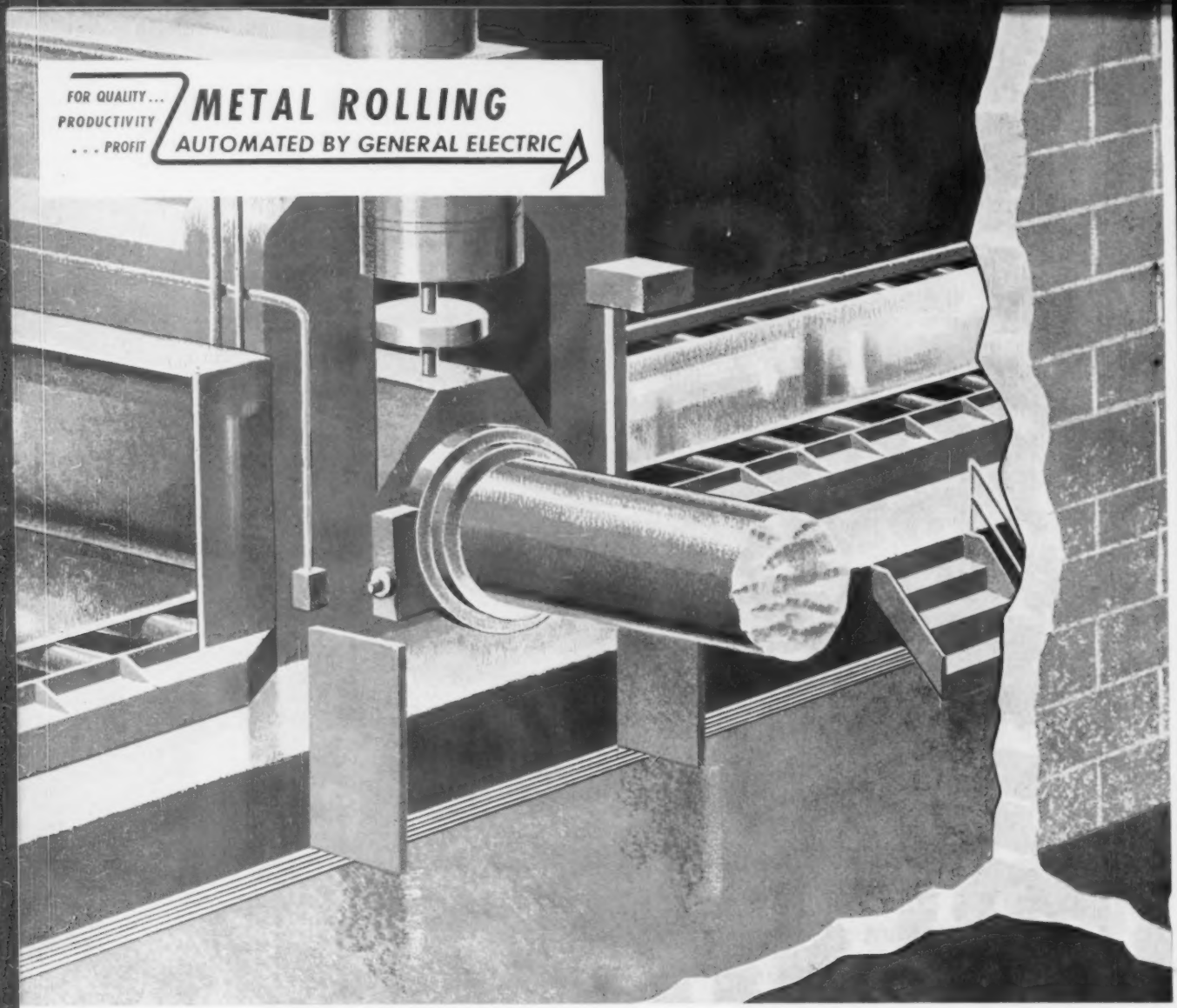
*Name*_____

*Position*_____

*Company*_____

*Address*_____

*City*_____ *State*_____



GENERAL ELECTRIC CONTROL FOR STEEL MILLS

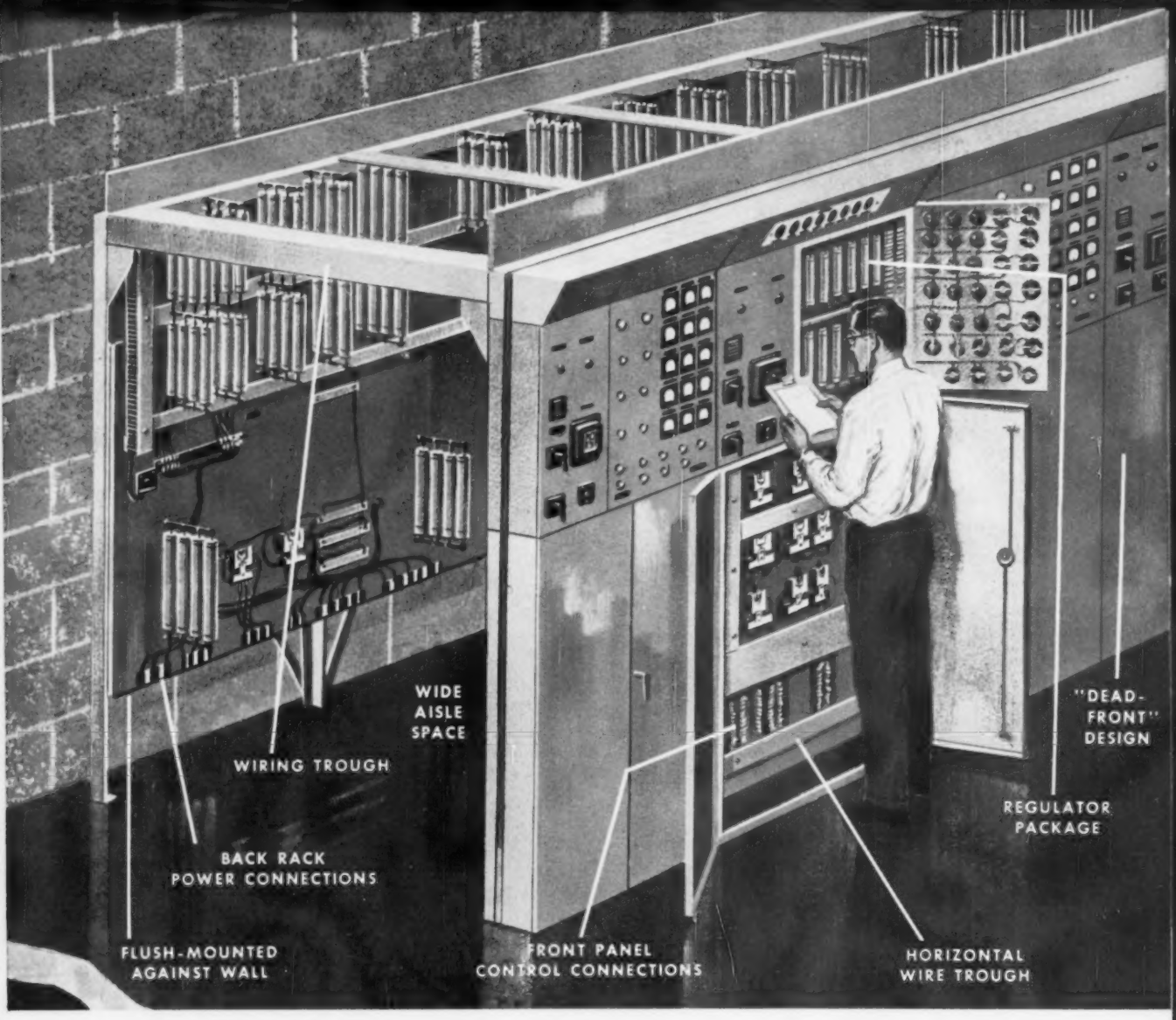
New control panels cut connection

General Electric has redesigned its industry-proved, heavy-duty, steel mill control panels—adding features to permit greater utilization of mill space . . . to save you time and money in installation and maintenance . . . and increase safety for operating personnel. The following cost-cutting and work-saving benefits tell the story of these new panels:

Reduced floor space—Compact design of this new panel cuts floor space needs up to 35 percent. More efficient arrangement of components provides added room for work inside the panel, yet reduces panel length. All incoming wires for control terminate at the front of the panel. All power wiring, including customer power connections, is isolated on the back rack. Use of welded studs and cage nuts permits installation against a wall —no need for additional work space behind panel. This saving in space means that valuable floor area can be used for other purposes, or construction costs of new buildings can be reduced.

Easier field connections—Installation wiring time is reduced as much as 50 percent by improved wiring lay-out. All incoming control wiring is brought to the front of the panel. A horizontal wire trough is available to the contractor to facilitate wiring to proper terminals and eliminate cord-tying bundles of wires in the field. Doors on the front of the panel open for access to terminal boards. For quick identification, terminal designations are permanently ingrained on the terminal board and into high-quality, plastic sleeves on each wire end.

Simplifed maintenance—Wide aisle between front panel and back rack makes maintenance easier and safer. Devices on front panel and back rack are connected *from the maintenance aisle,* allowing work from only



time 50%, required floor space 35%

one location. On the regulator package, fine-tuning adjustments are easier since potentiometers are located next to their related meters.

Increased safety—Since power wiring and all field power connections are isolated on the back rack, operating personnel are protected from accidental contact with high voltage. "Dead-front" construction, utilizing regulator packages and front panel devices behind doors, affords additional protection.

Improved appearance—All-steel bases provide rugged construction and uniform panel shape. Packaging of equipment into functional components and placement of contactors and relays behind doors give straight-line, modern appearance to panels.

For details on these steel-mill control panels, see your G-E Sales Engineer. Or write Sect. 785-13, General Electric Co., Schenectady, N. Y. for Bulletin GEA-6701. *Industry Control Dept., Salem, Va.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

Announcing the

BIG NEWS IN FORK LIFT TRUCKS

If you unload, move, stack and load heavy materials be sure to get information on the new big-capacity Towmotor "Monarch" Series Fork Lift Trucks. They're as new . . . all-new . . . as they look!

All eight of the new "Monarch" Series models are built to handle your roughest and toughest jobs . . . yet they are easy to handle . . . and feature—

- New High-Traction "Low Profile" Styling
- New Extra-Visibility Mast Design
- New Equalized Weight Distribution
- New "Unitized" Frame and Body Construction
- New Fingertip Control for Easy Operation

They all include many more engineering "firsts" described in new Towmotor "Monarch" Series bulletins covering models with 5 to 12 ton load capacities. For specifications, write Gerlinger Carrier Co., Dallas, Oregon.

TOWMOTOR

"MONARCH"

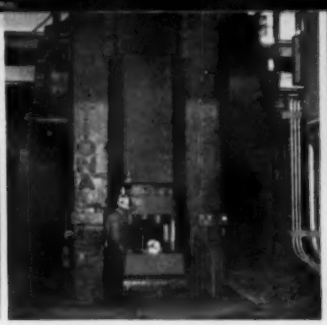
AN ALL-NEW SERIES OF HEAVY DUTY FORK LIFT TRUCKS BY

TOWMOTOR THE ONE-MAN GANG ® -GERLINGER

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co., Dallas, Oregon, is a subsidiary of Towmotor Corporation

In T & W's engineering department the information about your job is studied carefully. Dies and production are planned to meet your requirements most economically.



With over 140 hammers and presses, T & W is equipped to produce a wide range of forgings, from a pound in weight to over 500 lbs.

T & W's wide range of stamping presses, economically produce stampings from 3" x 3" to large stampings 40" by 60" by 14" deep.

Fully equipped laboratories provide the control of quality required for space-age metals and products.

Excellent quality control makes T & W forgings and stampings reliable, one reason why they cost you less at your point of assembly.

Delivery to you is precisely scheduled to your requirements—a big, wide range operation like T & W has the reserve power to hold to commitments even in emergencies.

T & W CAN HELP YOU SAVE MONEY!

T & W's wide range facilities help you do it

Your part requirements can be produced most economically when the right *size* and *type* of equipment is utilized. Part cost economy is the result of planning by T & W people experienced with *know-how* for doing a good job without waste.

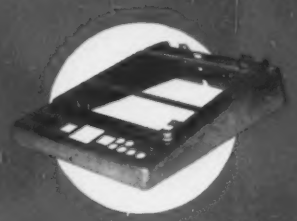
T & W's wide range of equipment, broad engineering knowledge in serving all types of industries, die designers, and production men all contribute to the T & W technique for saving you money. Ask to have a T & W sales representative call to give the details.

SALES OFFICES: PHILADELPHIA • OLD SAYBROOK, CONNECTICUT • CHICAGO DETROIT • DALLAS • LOS ANGELES • SEATTLE

HOW WIDE RANGE FACILITIES HELP INDUSTRY

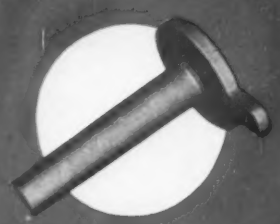
RADAR BASE STAMPING

Accurate to tolerance, and with cross-members already welded on by T & W, this 27" x 16" x 6" radar base is practically ready for assembly when delivered.



STEERING SPINDLE, UPSET FORGED

From its wide range facilities, T & W can choose the equipment to forge this 14" spindle, producing the required radial grain flow for maximum strength in the 5" head.



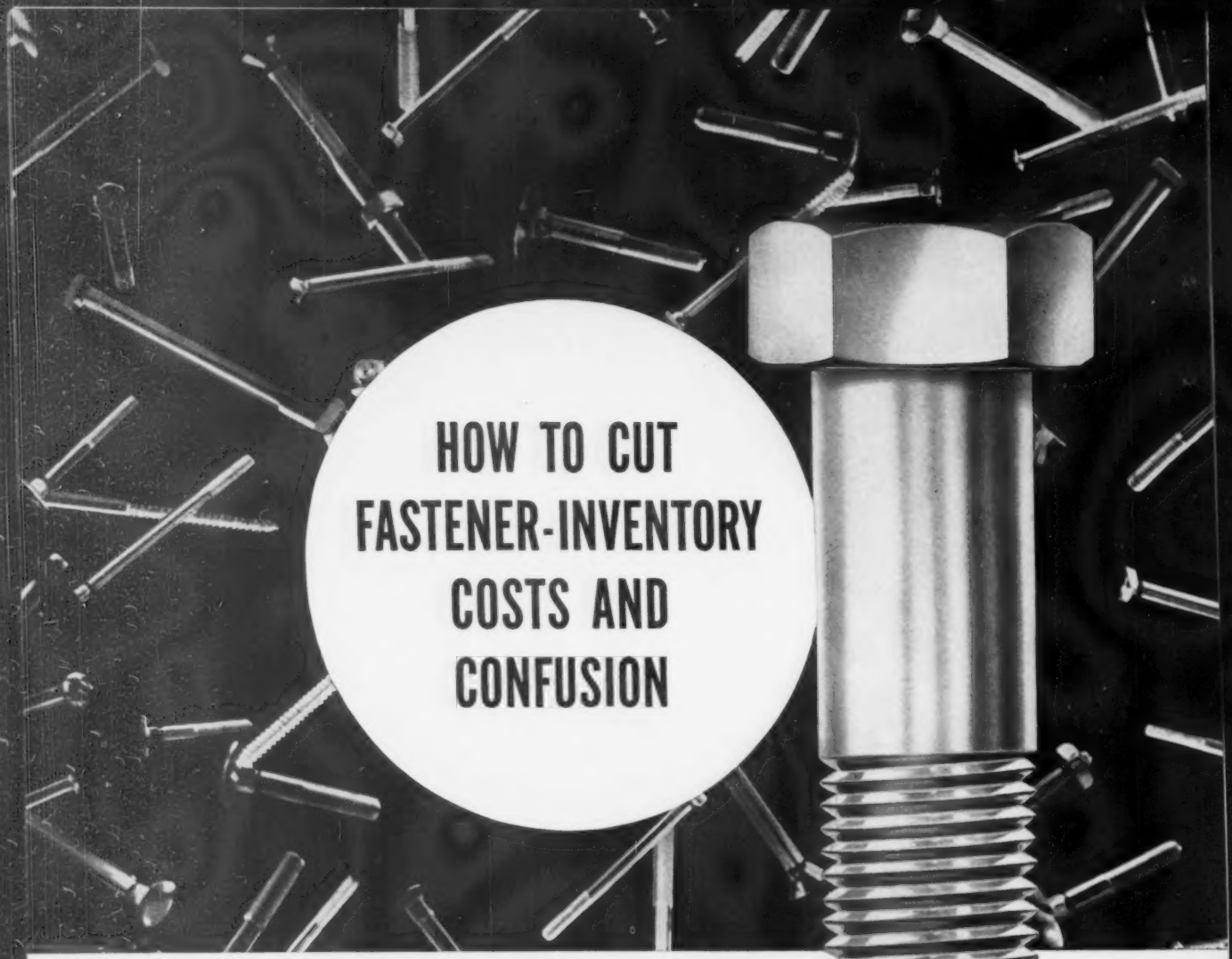
Write for information:

The booklet "Transue & Williams Challenges the Future" explains the wide range of facilities, and experience, which enables T & W to serve all American industry, and produce savings.

FORGINGS & DEEP DRAWN STAMPINGS

TRANSUE & WILLIAMS

ALLIANCE • OHIO, U. S. A.



HOW TO CUT FASTENER-INVENTORY COSTS AND CONFUSION

Your Republic Bolt and Nut Distributor Can Help You

A quick check of your stocks will tell. If your inventory's out of balance—loaded with seldom-used sizes or too-many-of-a-kind bulges—you need to cut fastener-inventory costs and confusion.

The man to call is your Republic Bolt and Nut Distributor. He's helped many other manufacturers with the same problem. The secret of his success—complete stocks of fasteners of all types and sizes; quick deliveries on requirements in any quantity; dependable, full-range services.

Because your local distributor maintains fastener stocks to serve hundreds of customers, his inventory cost per unit is rock bottom. This means that he can probably supply many of your present needs at lower costs than would be possible from your own on-hand stocks.

Get acquainted with your Republic Bolt and Nut Distributor. He is as close as your phone and ready to serve you now.

Steel

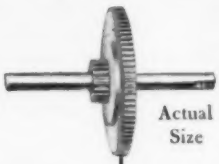
Strong,
Modern,
Dependable

Call your local distributor for quick deliveries of...

REPUBLIC Bolts and Nuts

REPUBLIC STEEL

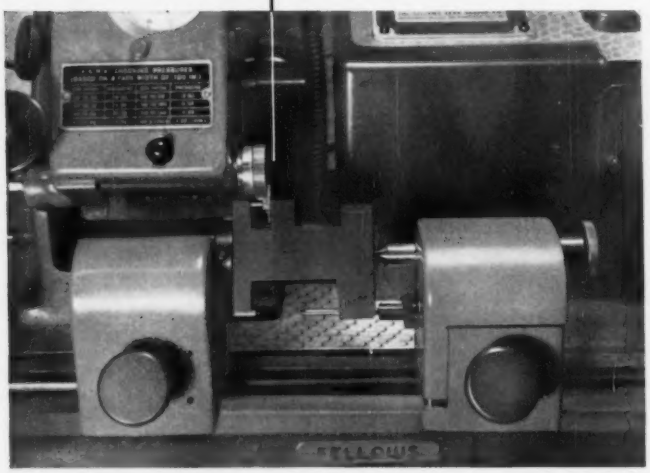
now you can check
and record fine-
pitch gear accuracy



Actual Size

at 1600 magnifications

on the No. 4 Fellows Red Liner



Now, the No. 4 Red Liner makes "composite" checks on the finest instrument gears with unbelievable accuracy and sensitivity. 1600 to 1 magnifications are obtained with the electrical recording system which gives a written, unbiased record for instant reading or for proof-of-accuracy files.

One report states — "11 teeth, 200 D. P. pinion backed up to a 100 tooth gear on a cluster, checked easily on the No. 4 Red Liner."

The job shown is 96 pitch with 22 teeth on the small gear and 80 teeth on the larger gear. The pinion shaft rides in vees in a turret-type fixture.

Fellows inspection units cover a range from the tiniest instrument gear up to some that are 24 inches in diameter.

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

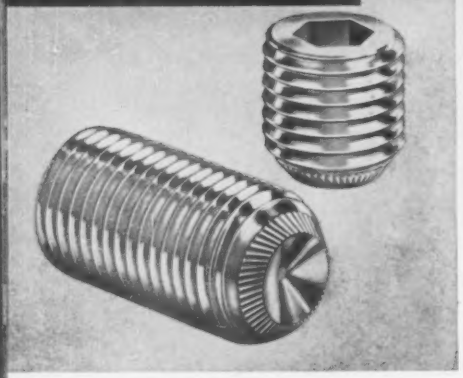
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N.J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

THE PRECISION LINE

Fellows

Gear Production Equipment

UNBRAKO



INDUSTRIAL FASTENERS like these Knurled Point Set Screws are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.

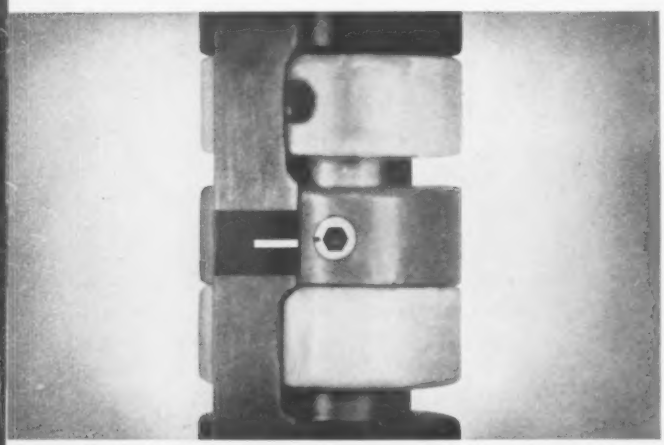
SPS AIRCRAFT

AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other light-weight, high-strength exotic metals.

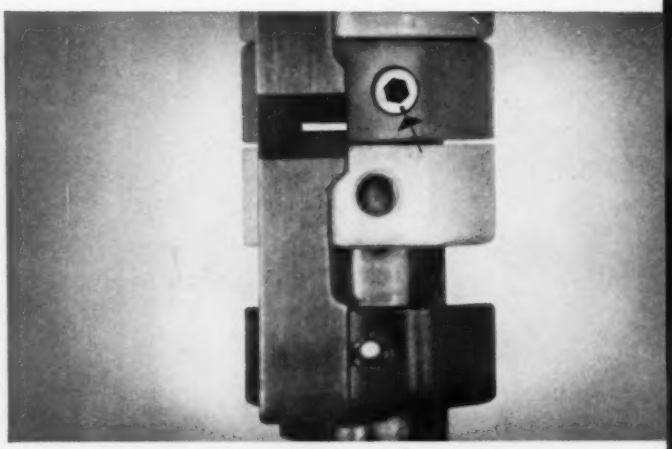
SPS NUCLEAR

NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

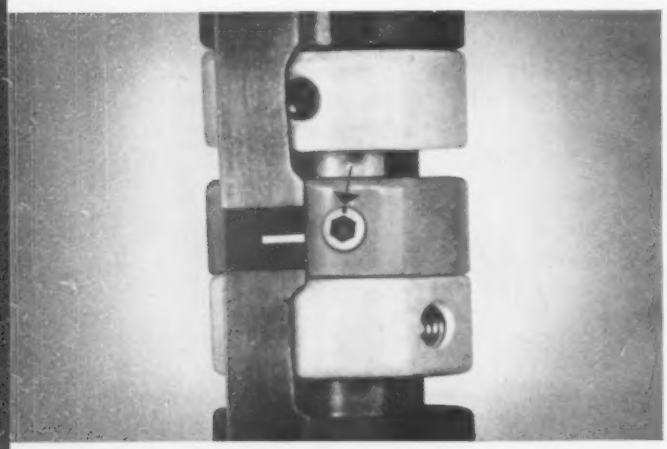
SPS self-locking fasteners sit tight



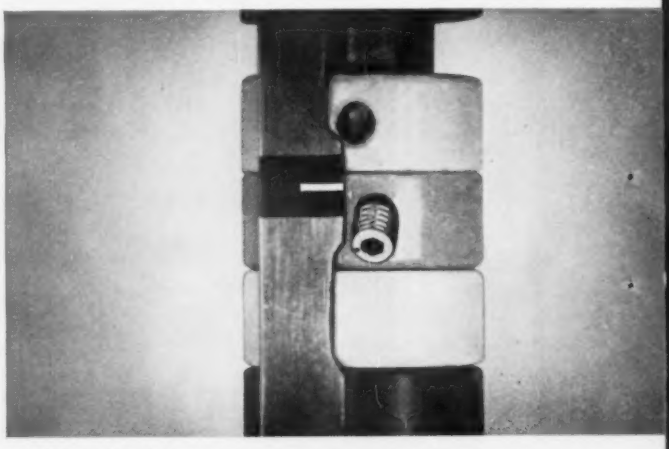
PLAIN CUP POINT *Socket Screw is tightened between two loose collars in Impact Induced Vibration Tester. Mark on socket screw lines up with index on machine.*



AT 1275 CYCLES *a minute, high speed camera catches test collar being pounded by loose collars above and below. Note that plain cup socket screw has already turned 90 degrees, collar has started to creep.*



IT'S LOOSE—*In less than 30 seconds, plain cup socket screw has turned 270 degrees, is completely loose. Test collar is now riding free on shaft.*

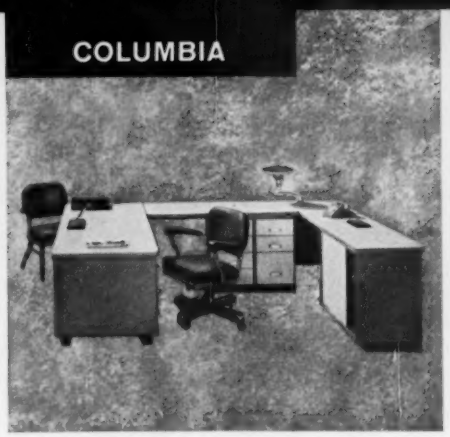


OUT IT COMES! *A few seconds later plain cup socket screw drops out of collar. In same test,* SPS UNBRAKO *Socket Screw with knurled cup point stayed in more than 4 minutes—over 8 times as long.*

HALLOWELL

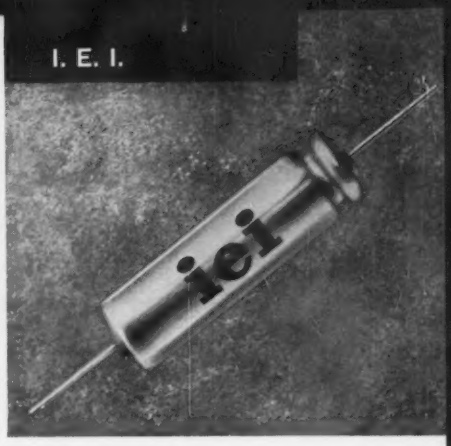
SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

COLUMBIA



OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

I. E. I.



CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.

while others get the shakes

Vibration is a killer.

Once it succeeds in working a fastener loose, things start coming apart in a hurry.

Some of the simplest, but most ingenious, engineering devices known to man now prevent vibration loosening of fasteners. When made right, and installed properly, they solve the vibration problem easily and economically.

The SPS family of self-locking fasteners includes such well-known names as UNBRAKO knurled point set screws that get a firm grip on the material they seat against . . . UNBRAKO with Nylok*, a nylon pellet in the thread area . . . Sel-Lok spring pins that expand against the hole walls . . . and Flexloc nuts with locking collars that squeeze the bolts for holding power.

All are re-usable. All can be installed quickly without special tools. And the reliability standards to which each is manufactured insure vibration proof performance in everything from power mowers to missiles.

Samples of any of these SPS self-locking fasteners will gladly be furnished upon request.

*T.M. Reg. U.S. Pat. Off., The Nylok Corp.

UNITED STATES

CANADA

SPS

where reliability ■ *replaces probability*

GREAT BRITAIN

EUROPE

STANDARD PRESSED STEEL COMPANY, Jenkintown, Pa. • SPS Western, Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Limited, Coventry and Sheffield, England • Unbrako Schrauben GmbH, Dusseldorf and Koblenz, W. Germany.

Whether furnace output is measured in grams or tons, Hevi-Duty's value solution pays steady operating dividends.

When you consult a Hevi-Duty Sales Engineer on any heat-processing problem, you take three important steps toward a sound solution. For Hevi-Duty helps you three ways:

Designs the system to fit your need. A Hevi-Duty Applications Engineer works full time on such problems. Call on him. He might save you countless hours. He may have solved a problem like yours last week.

Designs the furnace to fit the system. Usually, the unit you need will be a proven item, for you are drawing from the most complete line of heat-processing equipment in the business. If not, Hevi-Duty engineers can quickly design the unit that fits your needs exactly.

Builds the furnace to last. Hevi-Duty furnaces are built for tough, continuous production work. They are designed to last, and hundreds of case histories prove they do.

Here are three typical examples of non-ferrous melting furnaces spanning a wide range of sizes, yet each provides the value solution to a problem.

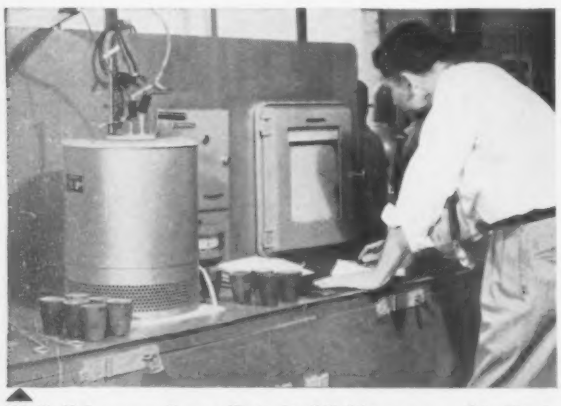
HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

B P C

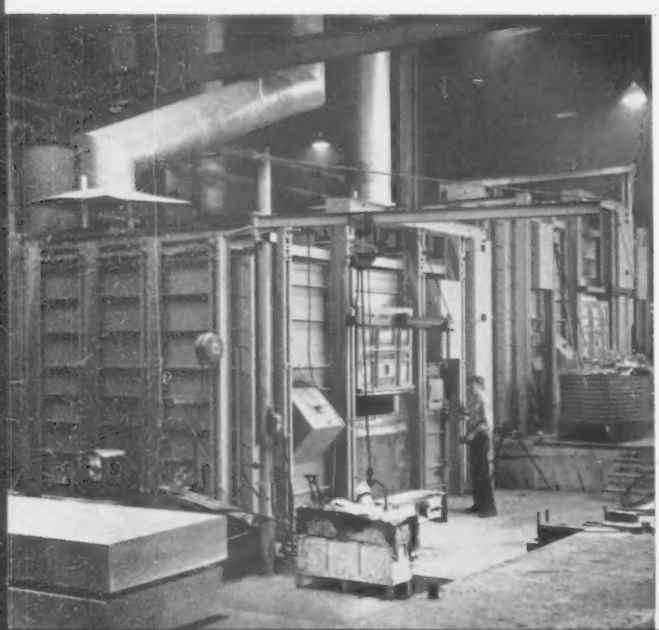
A Division of Basic Products Corporation

Hevi-Duty Electric Company, Milwaukee 1, Wis.



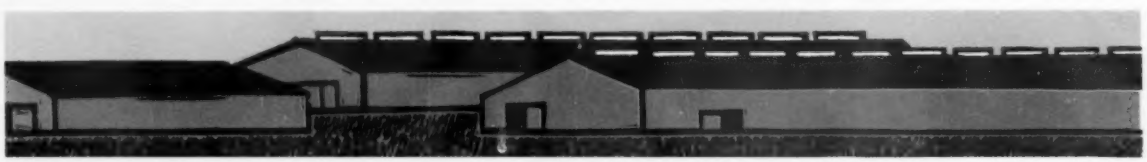
Wall Colmonoy Corp., Detroit, Michigan, uses this Hevi-Duty laboratory crucible furnace to find exact melting temperatures of hard-surfacing and brazing alloys. Furnace heats rapidly to the 2200° F. temperature required, provides precise control for melting and cooling tests on 250 g samples. User reports long element life at high temperatures. ***For more information, send for Bulletin 1246.***

This Hevi-Duty double-chamber, dry-hearth furnace melts 100 lb of aluminum per hour, 16 hours a day, 7 days a week at Alliance Mfg. Co., Alliance, Ohio. It can provide up to 200-lb-per-hour output and occupies little space. It maintains critical bath temperatures during charging. User states: "You can turn it on and forget about it." ***For complete information, send for Bulletin 593.***



Kawneer Company, St. Charles, Illinois, has installed a second pair of Hevi-Duty reverberatory furnaces for breakdown and holding in direct-chill ingot casting of four different alloys. Furnaces provide ± 10° F. control, pour at 1320° F., operate 24 hours a day. Capacity is 100,000 lb a day. Note in the foreground two of the 6,300-lb aluminum ingots produced. ***Please write for Bulletin 591.***

RISING FAST IN MID-AMERICA—
MIDWEST STEEL CORPORATION



Above, with the big "M" in it, you see the trademark of Midwest Steel Corporation, a new division of National Steel Corporation, now nearing completion in the heart of the metalworking industry of Mid-America.

It stands for a new, ultra-modern flat-rolled products plant—the most efficient and advanced in the country—soon to swing into operation on the Indiana shore of Lake Michigan.

It stands for a new look in steel plants, for handsome, green buildings and grounds . . . clean and well cared for.

It stands for new standards in steel products and for the finest steels: electrolytic tin plate, galvanized coils and sheets, hot- and cold-rolled sheets.

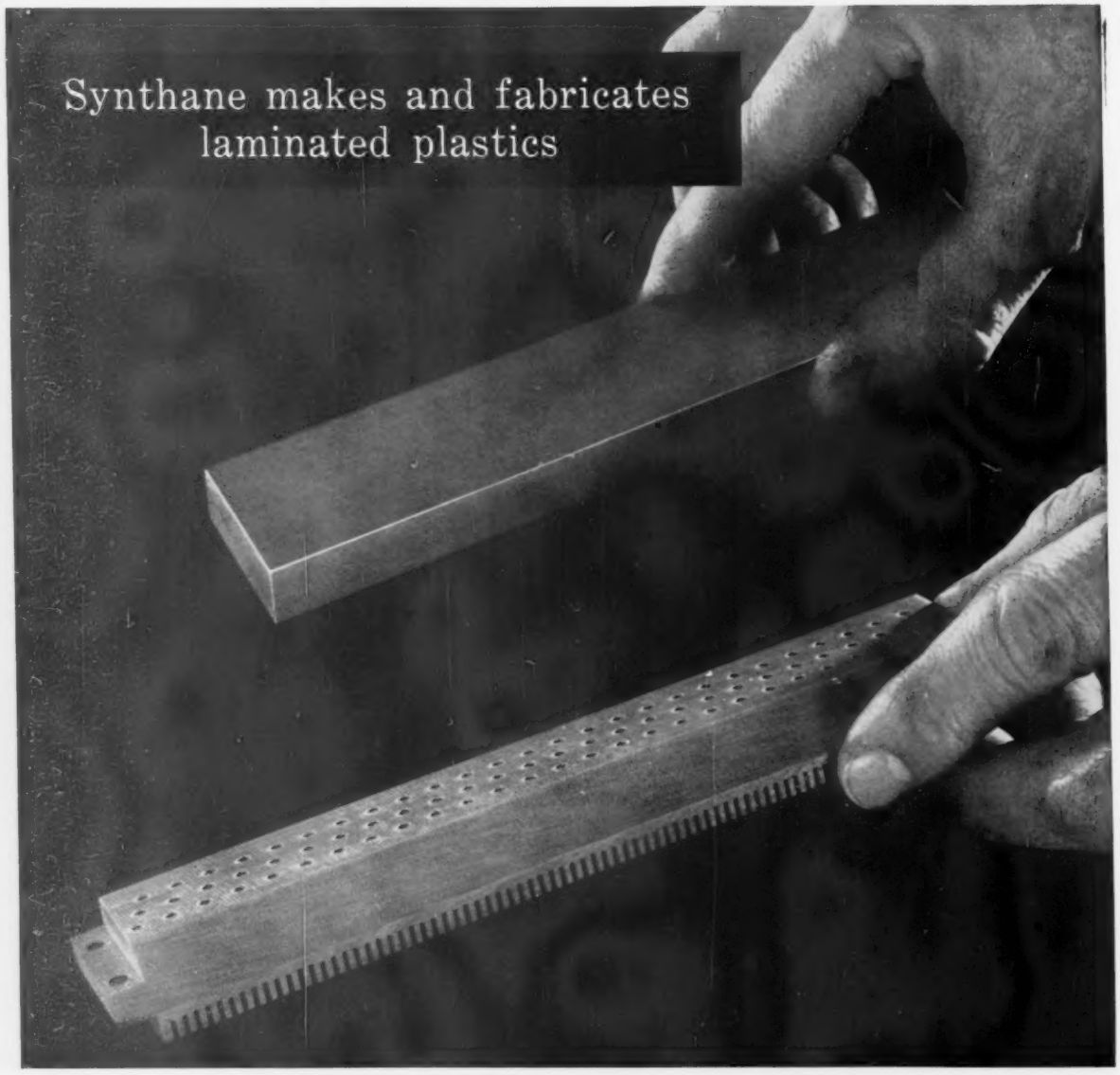
It stands for outstanding service, for new and economical solutions to your problems, for expert assistance whenever you need it.

It stands for a direct pipeline from our door to yours via waterways, railroads and highways.

Early in 1961, we'll be ready to roll. And the vast metalworking area ringing Chicago will have a new supply of quality steel on its doorstep. Midwest Steel will be in business, producing more muscle for Mid-America.

MIDWEST STEEL
Portage, Indiana

Midwest Steel is a division of **NATIONAL STEEL CORPORATION**



Why worry about fabricating laminated plastics? That's our job.

There is not much point to fabricating laminated plastics in your own shop. And there are good reasons why. One is the material itself.

Synthane laminates are available in sheets, rods, and tubes, and in over 33 standard grades. Choice of form and grade for your part is important. For example, a part which is basically tubular may have to be cut from a sheet rather than a tube. Or the material itself may have to be modified in order to meet your requirements.

When you do your own machining, responsibility rests finally with you. The possibility of errors in dimensions, machining and tolerances, and of waste and delay suggest that you buy your laminated plastics from us and let us do the fabricating for you. Call any of our representatives—in principal cities—for a quotation or get in touch directly with Synthane Corp., 56 River Road, Oaks, Pa.

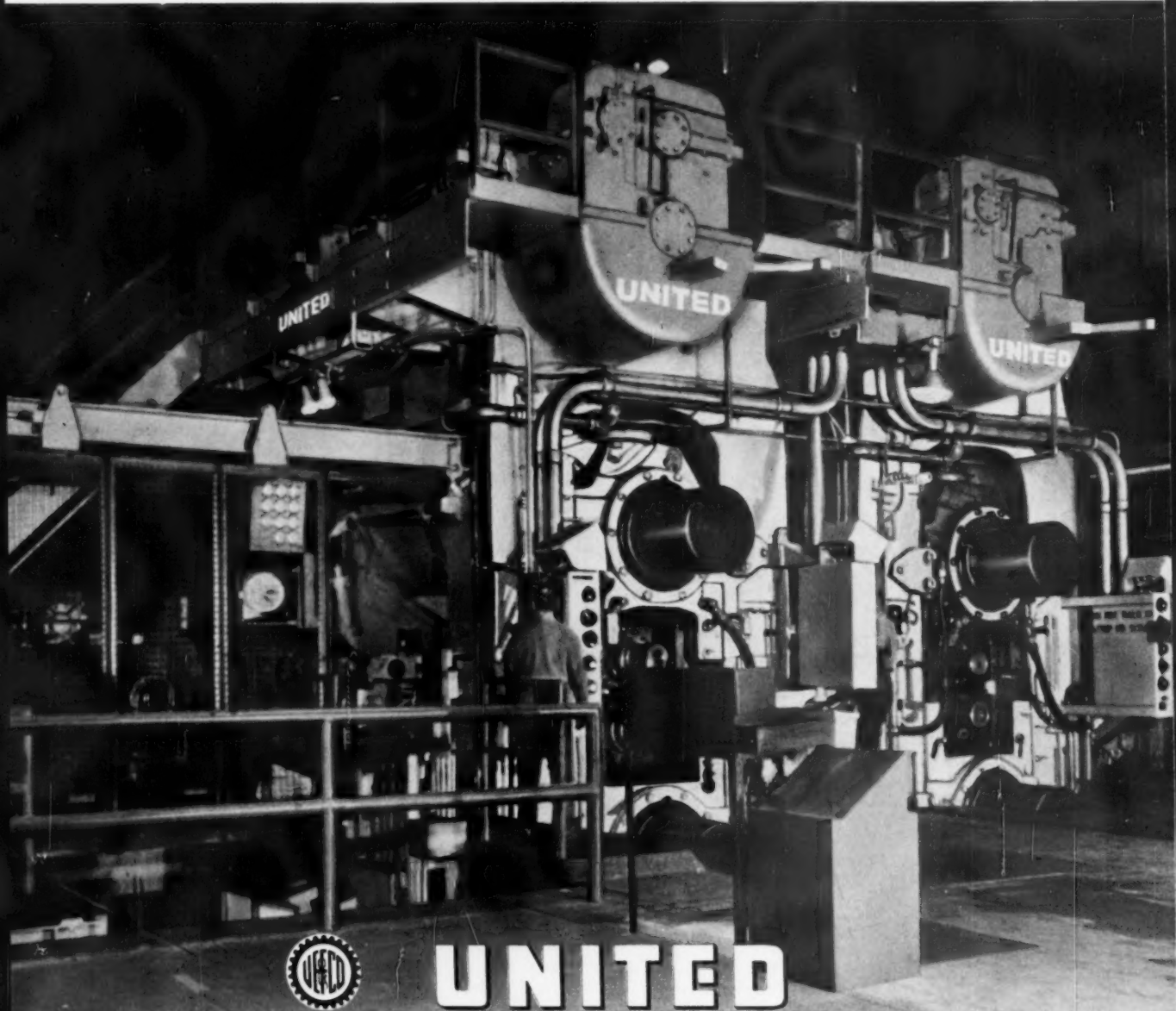
You furnish the print . . . we'll furnish the part

SYNTHANE
CORPORATION OAKS, PENNA.

Sheets • Rods • Tubes • Fabricated Parts
Molded-laminated • Molded-macerated

UNITED®

4-HIGH 2-STAND TANDEM TEMPER PASS MILL



UNITED

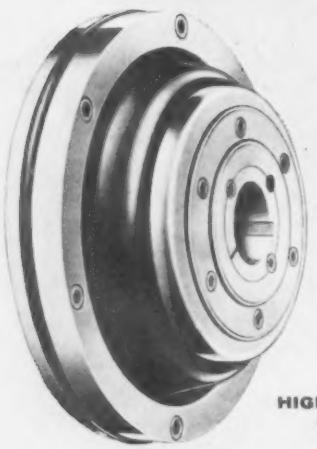
ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

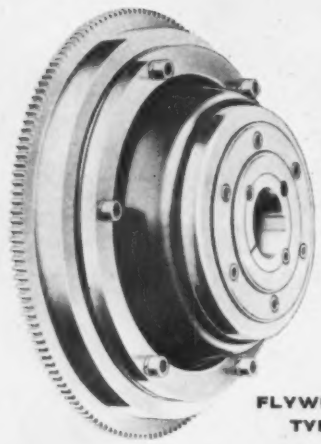
Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designer and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



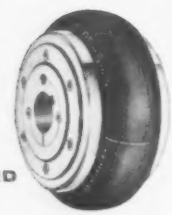
HIGH SPEED TYPE



FLYWHEEL TYPE

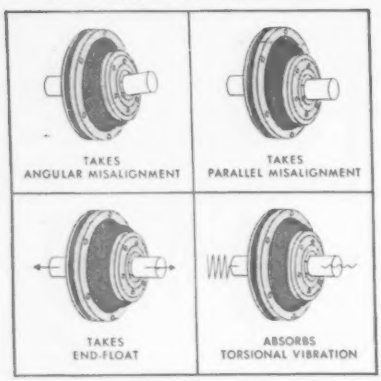
NOW! THE COUPLING WITH THE 4-WAY FLEX

IN TWO NEW TYPES — HIGH SPEED AND FLYWHEEL



STANDARD TYPE

THE 4-WAY FLEX OF PARA-FLEX



DODGE **Para-flex**

Industry asked for this—and here it is! Dodge Para-flex, the unique coupling that swallows up misalignment, is now available for high speed applications, and for high torque at either high or low speed.

The new Dodge High Speed Para-flex is specially designed for operation with motors and internal combustion engines that turn up to 5230 rpm.

The new Flywheel Para-flex, with the same capabilities, has a flexing element that bolts directly to the flywheel of internal combustion engines.

Like the Standard Type (with capacities up to 2000 hp at 1080 rpm) these new Para-flex Couplings feature a modern, tire-like flexing element that handles angular and parallel misalignment, end-float (or any combination) and absorbs torsional vibration. The amazing performance of Para-flex Couplings is a matter of record in thousands of installations.

Ask your Dodge Distributor—or write us for new technical bulletin.

DODGE MANUFACTURING CORPORATION
800 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Equipment."

Roebling Hose Reinforcing Wire...

The best things come in no-charge packages

When you buy Roebling Hose Reinforcing Wire it is delivered to you on no-charge spools that mean savings to you.

This modern method of packaging does away completely with deposits and the bookkeeping involved; it contributes, too, to lower freight costs and saves storage space. Thus, you avail yourself of a precision-made and quality controlled product, without any handling, shipping and inventory inconveniences.

Roebling Hose Reinforcing Wire, used for braiding reinforcement, is produced in a complete range of sizes. Write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey, for details.

Roebling . . . Your Product is better for it

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

"Only GAS gives quick, controlled, complete combustion"

Albert Holzwasser, President, Arrow Armatures, Boston

"Arrow Armatures is the largest rebuilder of automobile generators in the East. One of the important steps in rebuilding generators is burning the old insulation from the armature before it is rewound. Because gas gives quick heat that can be accurately controlled, it answers our need perfectly.

"We also have a gas-fired catalytic combustion unit to incinerate the smoke and fumes produced in burning off this insulation. Together these units give us complete, clean combustion with no smoke control problems," states Albert Holzwasser, President.

Quick, controlled, complete combustion—and the many other advantages of gas—can be yours, too. For technical information, see your Gas Company's Industrial Sales Engineer. He can show you the economies and results you'll get with modern industrial gas equipment. *American Gas Association.*

FOR PRECISE CONTROL, GAS IS GOOD BUSINESS!

DEMAG

Cost-conscious Engineering

Among the latest methods of rational steel production is the Rotor Process in which hot metal is refined into steel of open-hearth quality with the help of oxygen. The furnace is mounted on a tilting cradle so that two interchangeable vessels can be employed. Production need thus not be interrupted when relining is necessary. DEMAG has designed and constructed to its own system plants of 75 to 100 ton capacity for European and overseas customers.

DEMAG AKTIENGESELLSCHAFT DUISBURG GERMANY

US-Representatives: American DEMAG Corporation, One Gateway Center, Pittsburgh 22, Pa

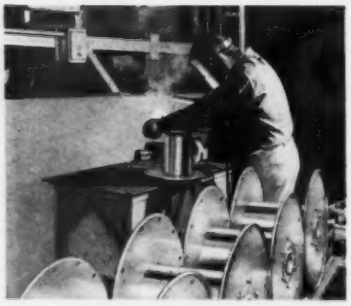
how PARISH CUT COSTS, saved time for another manufacturer

problem: A big user of wire cable needed wire reels requiring close parallel tolerances between heads in large quantities, at low cost—and fast!

solution: Parish engineers quickly blue-printed the problem and production specialists went to work. Soon Parish's skilled craftsmen, using the most modern precision machinery, were turning out 50,000 reels a month . . . meeting every specification perfectly, and on time.

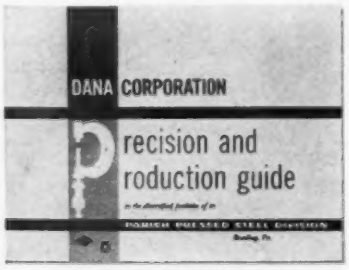
Parish specializes in solving production problems involving metal parts of all sizes, shapes, and forms. It is equipped to mass-produce precision parts at reasonable cost.

Perhaps Parish can help you • Write or telephone next time you have a parts production problem.



Bolts were welded to heads of wire reels to prevent back-out when reel is in high-speed operation. Main illustration shows how each reel was carefully tested before being shipped.

Write for your copy of this illustrated booklet describing the diversified facilities available to you at Parish.



PARISH
PRESSED STEEL
DIVISION OF DANA CORPORATION • READING, PENNSYLVANIA

cut man-hours to minutes

...with Black & Decker's Electric Hammer Line

2200 cutting blows a minute . . . that's how fast a Black & Decker Electric Hammer can break up masonry, scale weld splatter, channel in concrete or drill a hole. Man-hours drop . . . output soars! Every Black & Decker Hammer is *power-packed* to dish it out . . . *ruggedly-built* to take it . . . *user-designed* for easier operation. But see for yourself. Clip and mail this coupon NOW . . . or see your nearby B&D distributor. Four models, ¼" to 2" star drill capacity.

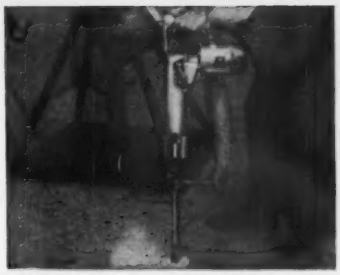
50th YEAR

Leading Distributors Everywhere Sell

See Tool-Electric -Yellow Pages- for Service & Sales

Black & Decker®

QUALITY ELECTRIC TOOLS



A HAMMER FOR EVERY JOB—a size for every need—that's the B&D Electric Hammer line! Four models give you a choice of ½", ¾", 1⅛" and 2" drilling capacity in concrete. And power-packed B&D Hammers' many *patented* features put them head and shoulders above the rest.

THE BLACK & DECKER MFG. CO., Dept. 0912
Towson 4, Maryland, (In Canada: Brockville, Ont.)

☐ Please arrange a demonstration of a B&D Hammer.
☐ Please send additional information on_____

Name_____Title_____

Company_____

Address_____

City_____Zone_____State_____

☐ Drills ☐ Sanders ☐ Scrugun® ☐ Bench Grinders

There's one exactly right for you...*Vancoram Chromium Alloys*

Because chromium improves steels and irons in so many ways, it has become one of the most economical and widely used alloying elements. Depending on the application and the percentage used, chromium imparts such properties as strength, hardness, toughness and corrosion resistance. The presence of chromium carbides also results in excellent cutting properties and wear resistance.

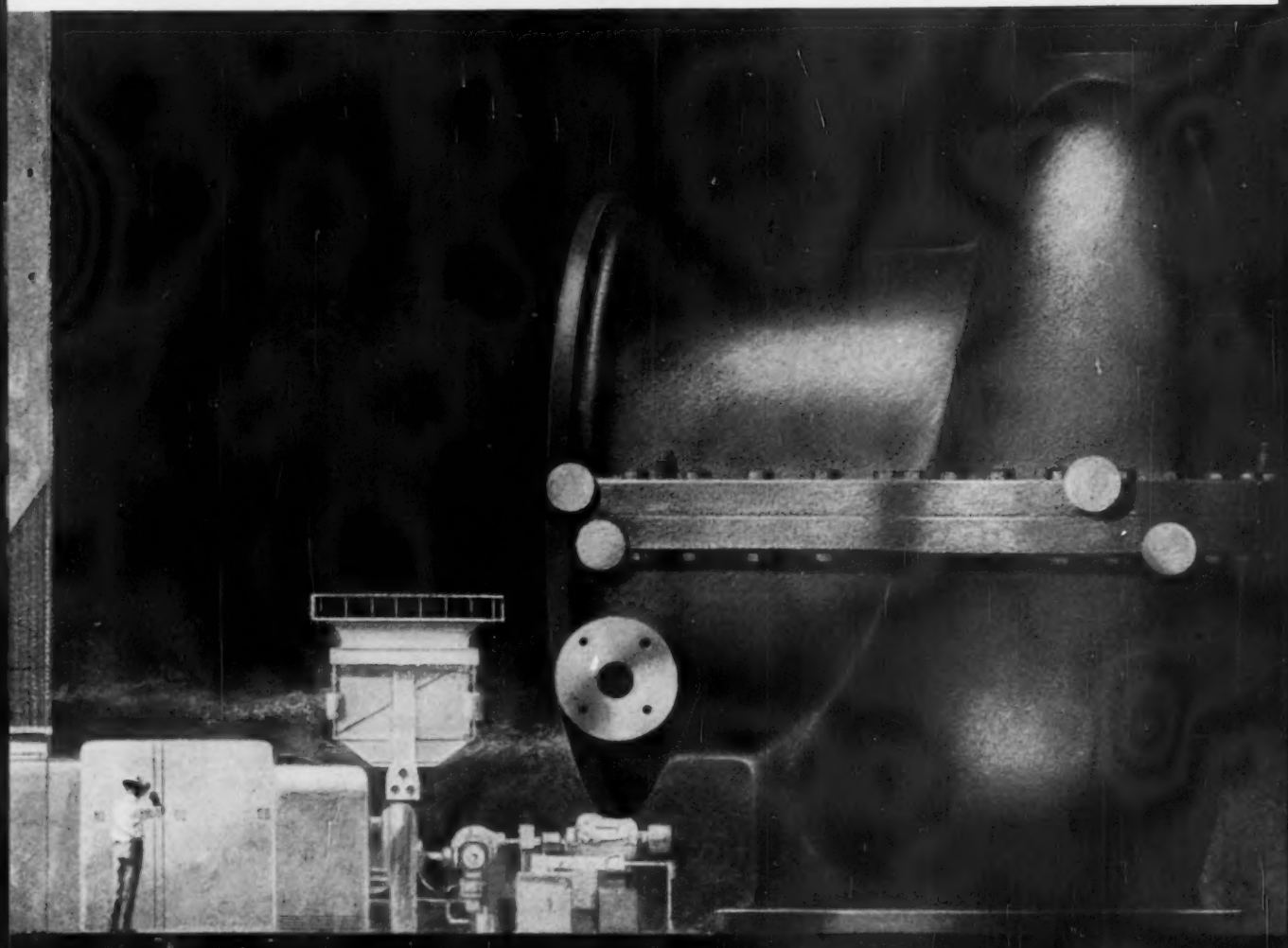
Naturally, for such a broad range of applications, no one alloy can serve for all uses; consequently, VCA produces more than thirty different chromium products, each tailored to do a specific job! The latest Vancoram Products list covers analyses and applications. VCA's technical staff will help you select the best for your needs. Just write or call your nearest VCA District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N.Y. • Chicago • Cleveland • Detroit • Pittsburgh

Stainless Steel

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

VANCORAM

How the Foundry Industry Serves America . . . #8 of a Series



IRON CASTING EFFECTS 4-WAY SAVING OVER WELDMENT

Substitution of high strength gray iron in this compressor discharge casing resulted in an important 4-way saving: 38% saving in weight, 58% saving in material cost, 25% saving in manufacturing time, and 34% saving in machining cost, as well as a considerable saving in shipping costs.

Originally the casing was made as a cast-weldment. It was redesigned, however, to take advantage of the fluidity of molten cast iron and its low shrinkage during solidification. These characteristics permit successful gray iron castings to be designed in shapes which are impossible with other materials or processes.

Because the iron could be placed exactly where needed, it was not necessary to build up the weight of the part by the use of fastening devices, welding or multiple pieces. Neither did it require costly machining.

This is factual proof that modern iron castings can deliver outstanding performance and impressive economies when specified by industrial designers.

For the production of structurally sound and economical iron castings, Hanna Furnace provides foundries with all regular grades of pig iron . . . including foundry, Bessemer, intermediate and low phosphorous, as well as HANNATITE® and Hanna Silvery.

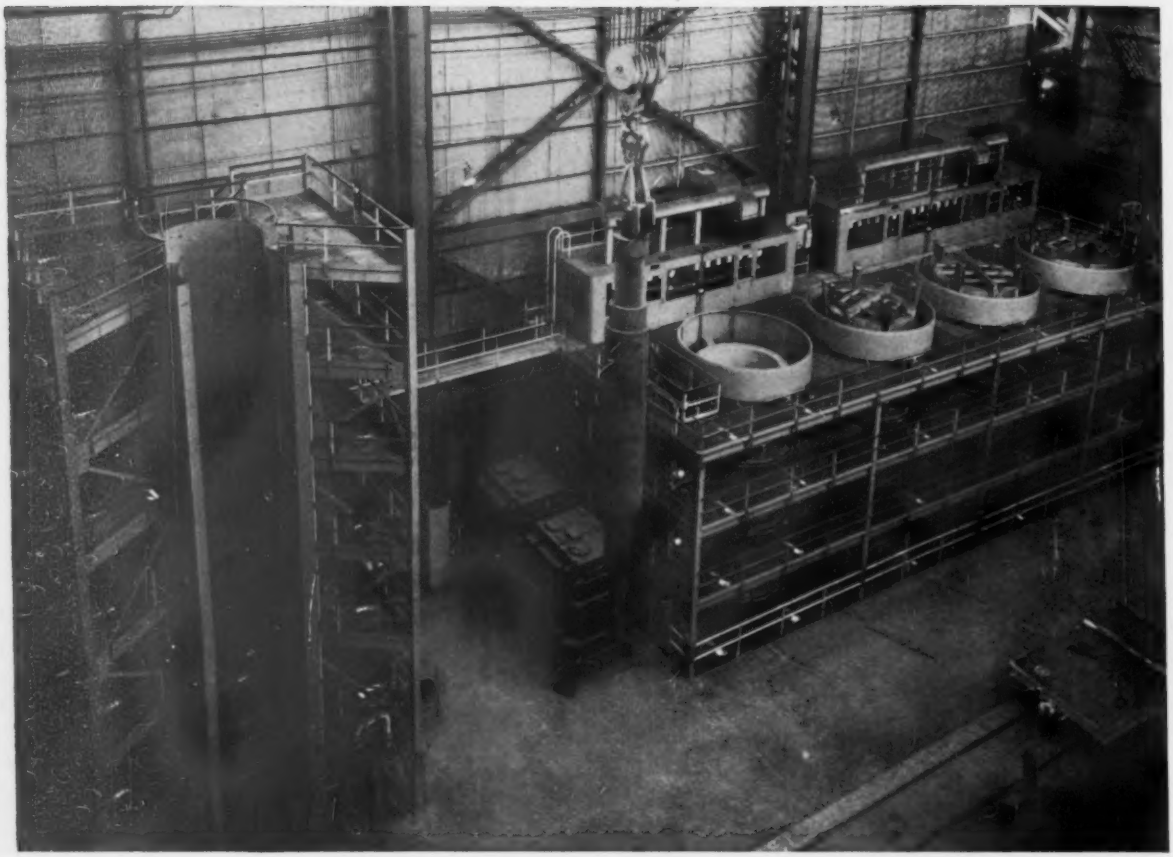
Facts from files of Gray Iron Founders' Society, Inc.

HANNA
THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

Hanna Furnace is a division of **NATIONAL STEEL CORPORATION**



VERTICAL FURNACES and QUENCH TOWER

at HOMESTEAD WORKS—Vertical furnaces and quench tower engineered and designed for heat treating rotors in upright position recently placed in operation at United States Steel Corporation's Homestead Works. These furnaces can accommodate electric generator rotors 40 feet in length and 60 inches in diameter.

This is another example of the ability of Amsler Morton engineers to translate a specific and unusual problem into a completely satisfactory installation.

Engineering Consultation in your plant on request

AMSLER MORTON COMPANY

ENGINEERS AND CONTRACTORS

division of TEXTRON, Inc.

In Canada: AMCO Furnace Contractors Ltd., Toronto, Ontario

MANOR BUILDING PITTSBURGH 19, PA.

SPEED UP
materials movement
REDUCE
your handling costs
BOOST
overall handling efficiency

do it with a UNIT MOBILE CRANE

With materials movement taking a bigger percentage of the production dollar every day and building costs still increasing, thousands of modern manufacturing plants are turning to low cost outdoor space for storage. New protective wrappings, coatings, and sprays make outside storage possible; UNIT Mobile Cranes, offering you all these "yard-proved" features, make it practical.

- **Self-propelled** and mounted on rubber, a UNIT Mobile Crane can service widely scattered storage areas.
- **Hydraulic steering,** air brakes, and an air-actuated transmission enable the crane to get in and out of tight quarters with little effort.
- **ONE MAN control** for all crane operations, plus travel and steering, from the operator's cab.
- **Short turning radius** and full 360° swing assure tight-area working ease.
- **Full Vision Cab** permits operator to see in all directions . . . promotes safety . . . increases efficiency.
- **Disc-type clutches** provide uniform, positive engagement . . . loads are picked up smoothly and evenly.
- **Powered Boom** . . Power raised and controlled lowering of the boom means safe, precise load handling.

***UNIT** Mobile Cranes are available in two sizes — the 15-ton Model 357 and the 20-ton Model 1520T. Plus, a complete line of crawler and truck cranes. Your UNIT dealer has complete information — call him soon.*

UNIT

UNIT CRANE & SHOVEL CORP.

6517 W. Burnham St., Milwaukee 19, Wisconsin

"Our people jumped at the chance when we offered the Payroll Savings Plan"

"We invited every employee in the company to come along with us on the Payroll Savings Plan and invest in U.S. Savings Bonds regularly. The response was excellent. People appreciate having the tough job of saving done *for* them—and a lot of them took time to thank us for it. And besides feeling good about building a nest-egg, they're proud to be part of an effort that helps keep our country strong. This Plan makes them feel they 'belong,' and that's the best kind of personnel relations."

If your company hasn't gotten around to putting in the Payroll Savings Plan, contact your State Savings Bonds Director and let him show you how simple the Plan really is. Get his experienced help in presenting the Plan to your organization. Or write Savings Bonds Division, U.S. Treasury Department, Washington, D.C.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

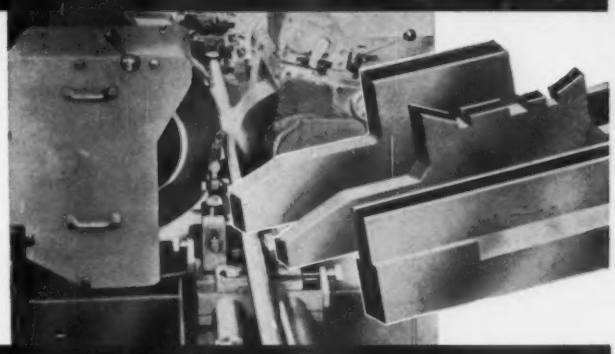
The IRON AGE

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Talide® BLADES for centerless grinding

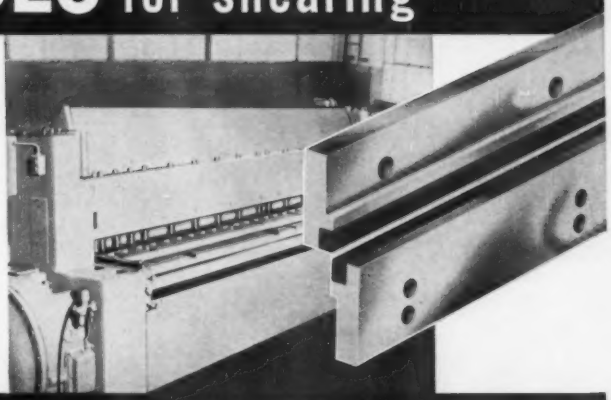
25 YEARS OF TOP PERFORMANCE

using Talide-tipped work support blades on Landis, Cincinnati and Van Norman centerless grinders. Available in lengths up to 120". Tipped with a ONE-PIECE carbide wear strip. No section or seam marks to score or scratch the work. Users prefer blades of Talide superior construction. Over 50 sizes and styles of standard blades are carried in stock. Special blades made promptly to order.



Talide® BLADES for shearing

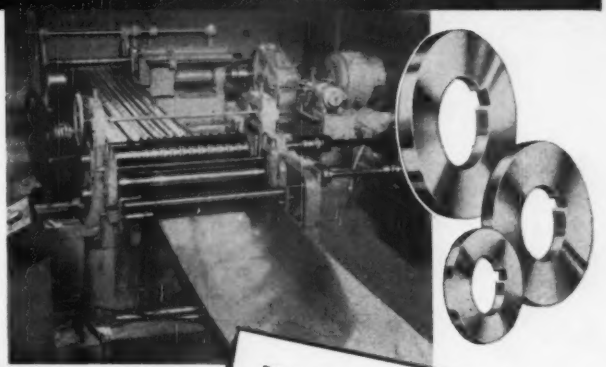
5,631,000 CUTS WITH 59" LONG TALIDE SHEAR BLADES on a Keystone Shear at Westinghouse Electric cutting 29 gauge silicon steel up to 36" wide. 8 months' service life between regrinds saved $2,000 in grinding and set-up time. During this same period it was previously necessary to grind high-carbon, high-chrome blades 24 times — and make frequent replacement. Talide blades normally stay on the job for several years giving high-speed, continuous, burr-free production.



Talide® BLADES for slitting

TALIDE ROTARY KNIVES GIVE PHENOMENAL RUN OF 90 - 1 . . .

A leading strip steel producer of razor blade, high-carbon, spring and stainless steel reports over 1200 coils were gang slitted with Talide knives, compared to 15 coils with steel knives. More tonnage was produced in one regrind of the Talide knives than over the entire life of a set of steel knives. Burr-free, clean-cut edges produced with scrap rate practically eliminated.



Courtesy: Yoder Co.

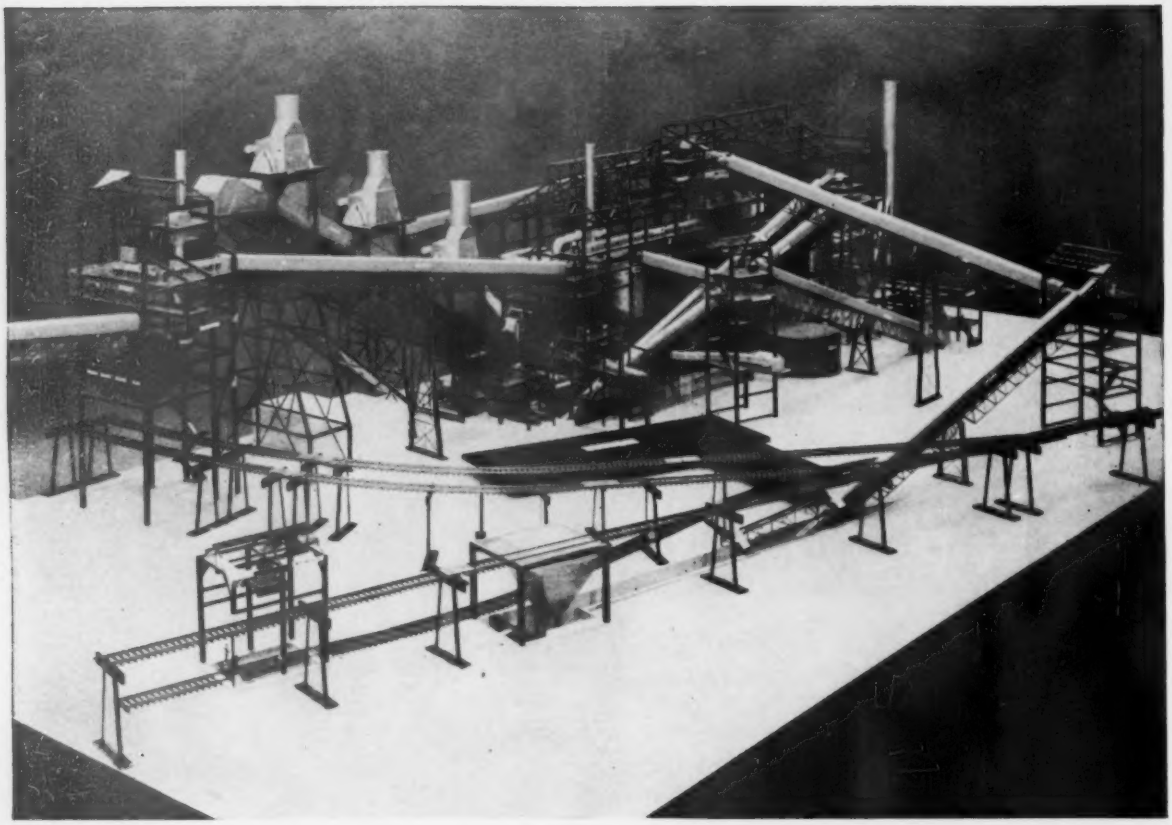
Write for Catalog 59-G Today!

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

EXCLUSIVE RETIPPING SERVICE

Because of its exclusive hot press method, Metal Carbides is able to re-work worn, chipped-out or broken areas of carbide-tipped blades back to original size and dimension with all breaks and defects eliminated.



Scale model of the newest Dravo-Lurgi sintering plant, now under construction for Interlake Iron Corporation.

47,500 tons per day

Dravo-Lurgi Sintering and Pelletizing Plants, some still under construction, will produce in excess of 15,500,000 tons of sinter or pellets per year.

Listed here are the major Dravo-Lurgi projects:

In Operation	For	No. Machines	Capacity
Gary	United States Steel Corp.	3	15,000 tpd
Saxonburg	United States Steel Corp.	3	15,000 tpd
Ashland	Armco Steel Corp.	1	2,400 tpd
Trenton #1	McLouth Steel Co.	1	2,100 tpd
Trenton #2	McLouth Steel Co.	1	2,100 tpd
Copper Cliff, Ont.	International Nickel Co.	1	1,100 tpd
Under Construction			
Chicago	Interlake Iron Corporation	1	3,300 tpd
Aliquippa	Jones & Laughlin Steel Corporation	1	6,500 tpd
		Total:	47,500 tpd

In addition to these complete plants, Dravo has built sinter coolers of several types for a number of existing sinter machines. These coolers are designed to reduce sinter temperatures at the maximum rate consistent with minimum shattering, and unload the cooled sinter without further breaking.

This extensive experience with sintering and pelletizing plant design and construction can be brought to bear on your specific requirements. We will be glad to discuss the latest techniques in ore agglomeration with you or your staff. Write or phone Dravo Corporation, Pittsburgh 22, Pa.

DRAVO
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • docks and unloaders • dredging • fabricated piping foundations • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

Pat. No. 2355224

only vega offers you all these advantages

order after order after order... minimum size change and distortion... low temperature heat treating... uniform deep hardenability... freedom from scaling... good machinability... exceptional toughness with good hardness... no preheating in hardening. From start to finish you enjoy exceptional simplicity and safety and predictable performance. Produced by the MEL-TROL® Process... Only Carpenter VEGA-FM assures such uniformity of benefits. Use this MATCHED SET of Air-Hardening Tool and Die Steels—VEGA-FM (Type A-6), No. 484-FM (Type A-2), and No. 610-FM (Type D-2)—for proper selection and consistently better results. Call your Carpenter SERVICE-CENTER for prompt delivery.

Carpenter steel

you can do it ***consistently*** better with Carpenter Tool and Die Steels

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

How Electric Home Heat Finally Became a Reality

The extraordinary versatility of Nickel that today brings you electric home heat could tomorrow bring a solution to a metal problem in your own business

Ever have a metal problem you couldn't find the answer to . . . and then discover that the solution was there all the time?

The people in the electric home heating industry needed a resistance wire that had special properties: strength and durability for long-term service – resistance to oxidation and extreme heat – good electrical resistance properties for efficient and economical operation.

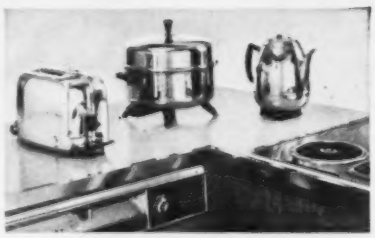
They experimented – tested – then found the solution right in their own plants. For years Nickel alloy resistance wire heating elements had made dependable performance a reality in electric ranges, toasters, dishwashers, irons–had in fact introduced a new concept of quality in modern appliances.

This resistance wire – made of a special alloy with a Nickel base – will hold up under years of off-and-on heating and cooling. Will resist heat and corrosion to give the desired long service and trouble-free performance.

Now, Nickel is making electric home heat a practical reality. This winter, for example, nearly one million American homes will be heated electrically. Industry, too, is finding electric heat eminently suitable for plants, stores, office buildings – all types of commercial structures.

Your metal problem. Whether the challenge is one of stress, fatigue, corrosion or temperature extremes, Nickel and its alloys have a durability that's hard to beat. Next time *you* have a metal problem, think first of Nickel. And remember that Inco will be glad to supply any technical data you may need. Just ask us.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.



Dependable appliances use Nickel. Electric ranges, dishwashers, toasters, percolators, irons . . . all rely on Nickel alloy resistance wire heating elements for long service life.

This symbol on a new home is your assurance of the ultimate in modern electric living. Look for it when you buy.

FOR MORE INFORMATION ABOUT ELECTRIC HOME HEATING – see your local Electric Power Supplier.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

General Electric, as developer and user of many heat processes, has the know-how to reduce your costs and improve your product quality.

HEAT
from General Electric

How General Electric heat process know-how can cut your costs, improve product quality

There's only one correct starting point in manufacturing an industrial furnace—process know-how. By building on our knowledge of your particular heat processing problems, General Electric is able to develop the most economical heating method for quality results on your line.

Example: A commercial heat treater now saves nearly 50 percent of his raw material costs while maintaining quality specifications. General Electric understood the product requirements, and developed a heat treatment which permitted substitution of common iron for silicon steel.

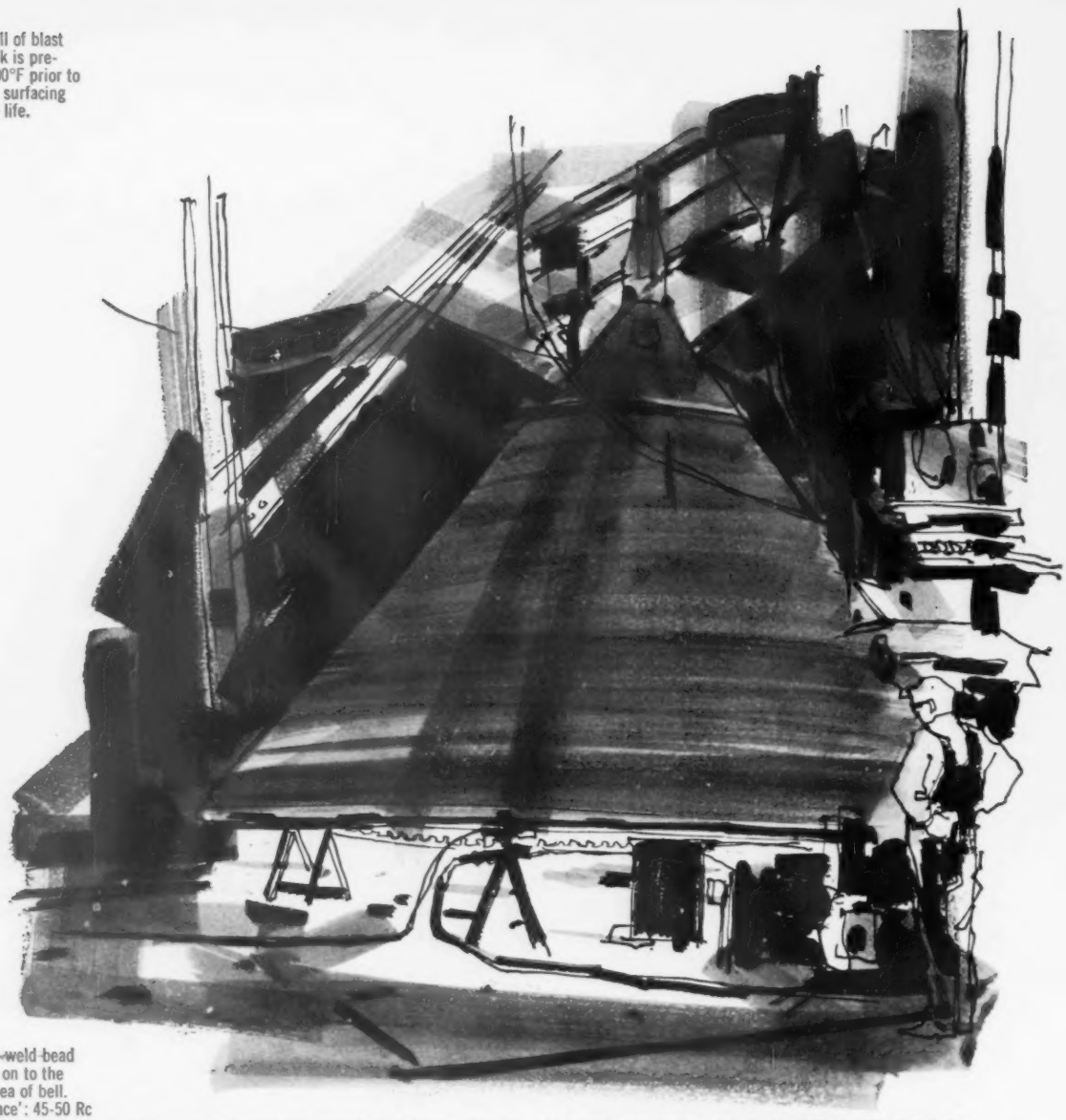
Example: Shorter production cycle and reduced cost resulted when pickling was eliminated in one manufacturer's process. Bright annealing of stainless steel parts in a General Electric mesh-belt, semi-continuous muffle-less furnace produced bright, shiny parts of high quality.

Ask your nearby General Electric Apparatus Sales Office to analyze your heating process requirements. A G-E heating specialist will provide you with the "added value" service that can improve your product and save you money for years to come.

721-31

GENERAL ELECTRIC

■ Giant bell of blast furnace stack is pre-heated to 400°F prior to Mahon hard surfacing for renewed life.



■ A hard-weld bead is spiraled on to the working area of bell. 'New Surface': 45-50 Rc

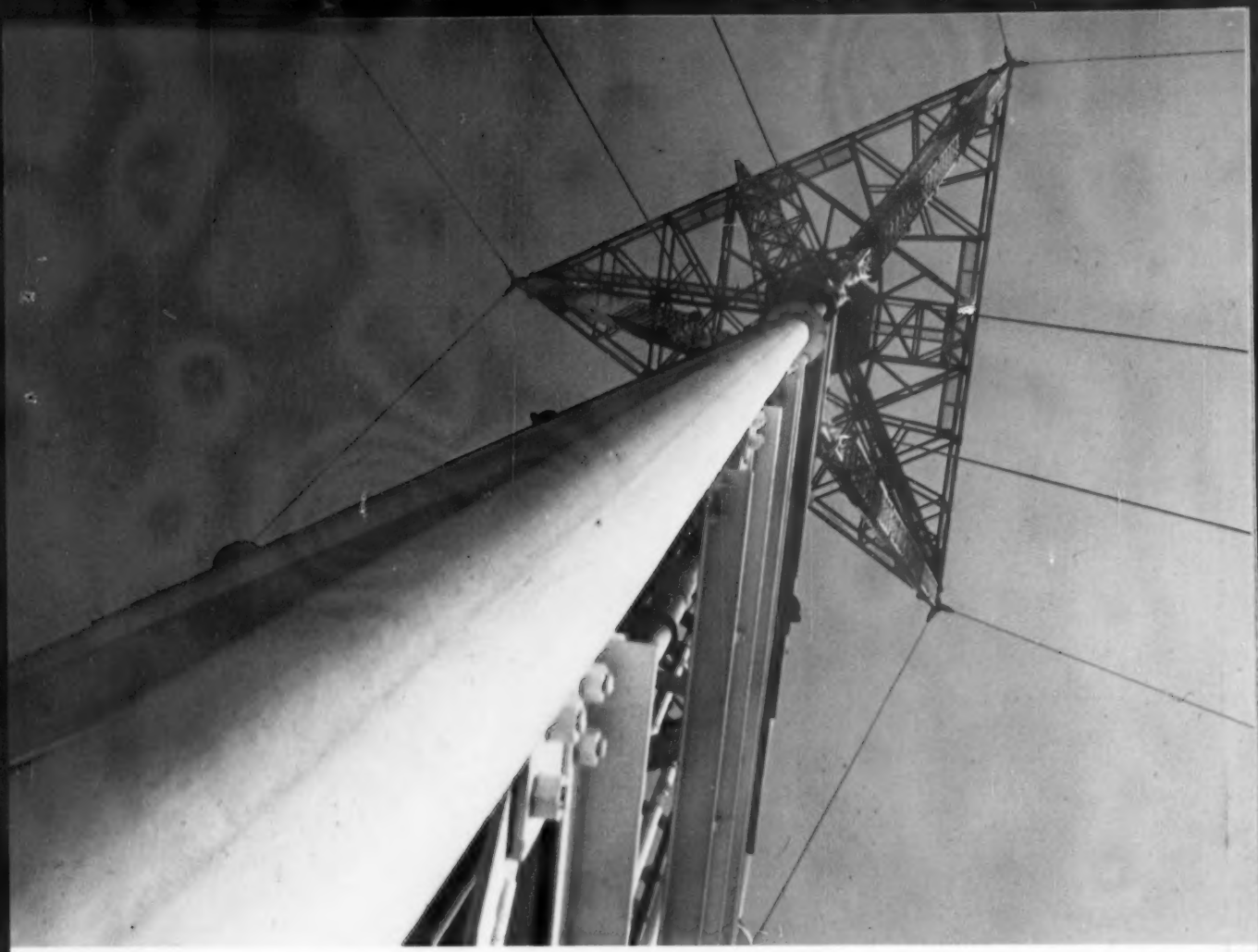
MEN WHO KNOW FACILITIES, CAPACITY AND **NEW TECHNIQUES . . .**
BUY **"fabrication by Mahon"**

Mahon's Steel-Weld Division constantly strives for better fabrication techniques—solidly developed out of long experience combined with broad-range facilities and wide-breadth capacity. ***Example: new hard-coat (to 45-50 Rc) resurfacing*** of worn steel parts for extended useful life. The Mahon method involves special submerged-arc welding, vertical milling and finish grinding. It is as applicable to high-wear new parts as it is to reconditioning older pieces. Why not look into how Mahon 'hard-surfacing' can be profitably used in the products you make or the equipment you use? We suggest you write to Mr. J. W. Ault, Manager of Mahon's Steel-Weld Division.

THE R. C. MAHON COMPANY • DETROIT 34, MICHIGAN

Manufacturing Plants—Detroit and Torrance, Calif.
Sales-Engineering Offices: Detroit, Chicago, New York, San Francisco and Torrance

MAHON



"T-1" Steel cuts size of tower legs 50%

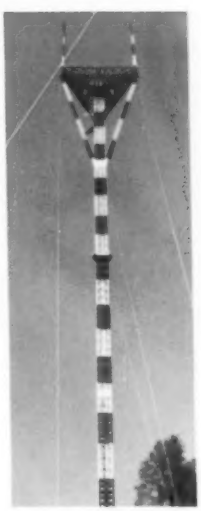
This spectacular, 730-foot, candelabra-type TV tower in Baltimore, Maryland, was built to withstand hurricane winds of 165 mph. The legs had to be *extra* strong to support the weight of three 10-ton antennas plus the weight of a triangular platform 105 feet long on each side.

The designers chose USS "T-1" Constructional Alloy Steel for the legs because its great strength permitted a reduction in leg size of almost 50%. Wind resistance was reduced and only 105 tons of 5¾" to 7" quenched and tempered, straightened and stress-relieved "T-1" Steel rounds were used for the legs. If structural carbon steel had been used, approximately 300 tons of steel in diameters up to about 12 inches would have been necessary.

Chief advantages of USS "T-1" Steel

You may not be in the market for a TV tower, but if you are building large structures or rugged equipment, "T-1" Steel offers these plus values:

Super Strength—Minimum yield strength 100,000 psi in bar diameters up to 4 inches or plate thicknesses up to 2½"—three times the yield point of structural carbon steel.



World's first 3-antenna, candelabra-type TV tower for Baltimore stations WBAL, WJZ and WMAR. Designed and fabricated by Dresser-Ideco Co., Columbus Ohio. Erected by J. F. Beasley Construction Co., Muskogee, Okla.

Resistance to impact abrasion—Very high. Shovel parts, truck liners, conveyor parts, bins, chutes last up to five times as long.

Atmospheric Corrosion Resistance—Four times that of carbon steel. This results in a considerable increase in paint life.

Toughness—Outstanding at both low and high temperatures.

Weldability—Readily weldable without preheating or stress relieving.

Costs—Where the designer takes full advantage of "T-1" Steel's superior properties, overall costs can be greatly reduced due to sizable savings possible in material, fabrication, construction and maintenance.

Write for our book, "USS 'T-1' Steel," which gives complete information. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and "T-1" are registered trademarks

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

This mark tells you a product is made of modern, depend

New top for the Shippingport

By the Ohio River at Shippingport, Pa., the United States' first
station atomic power plant devoted exclusively to civilian needs c
erate electricity for the Pittsburgh district. In operation since 195
reactor core received its second "seed" fuel early this year. The pion
is a joint project of the Duquesne Light Company and the Atomic Ene

The nuclear portion of Shippingport was designed and developed
under the direction of and in technical cooperation with the Naval
of the Atomic Energy Commission. The work was done at the Bett
Laboratory which Westinghouse operates for the AEC.

U. S. Steel's Homestead Plant is supplying the forgings for
assembly needed to accommodate a new and higher power core bei
the Bettis Laboratory for Shippingport. As furnished, the 3-piece
81 tons—and every ounce of these USS Quality Forgings have b
machined and tested to meet the most rigid specifications.

The reactor's new closure-head assembly for Core 2 consists of a
head flange. The largest piece—the head flange—weighs 41 tons
highest degree of quality from the start, it was electric-furnace
Ni-Cr-Mo alloy steel, then teemed into a 180-ton ingot in U. S.
casting facilities. After top and bottom discard, it was forged to
then it was upset to 60″ in height. Next a 30″ hole was punched in
mandrel forging. This hole was later opened up to take a 36″, a
forging bar. At this point the ring was flattened to 43″, the bar wa
in the center and the ring was mandrel-forged to its final dimensio
diameter, 98″ interior diameter, and 42½″ high, as shown in the
then weighed 83½ tons and was ready for heat treating and prelimi
Final machining reduced the flange's shipping weight to 41 tons.

The torus, or "transition ring," was manufactured from the sam
in the same careful, expert manner. It weighs 23 tons after final m

The dome is hollowed out on the inside and has a relatively small
middle. This hole will provide a refueling port; separate opening
mechanisms will be bored later. The dome was machined on our 20
mill with the aid of an electronic contouring machine. Final weight of t

Dome, torus and flange were painstakingly tested and inspected
way. Tests included ultrasonic inspection, tangential tension tests,
impact tests, grain size tests, bend tests and magnetic particle ins

U. S. Steel has the capacity, the men, and the equipment to man
forgings like these, whether they be rings, flanges, domes, pressurize
other such nuclear and power plant components. And the very same
ment will be working on *your* order. For a free folder on USS N
write United States Steel, 525 William Penn Place, Pittsburgh 3

USS

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Export Company

United States Steel

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SS Nuclear Forgings,
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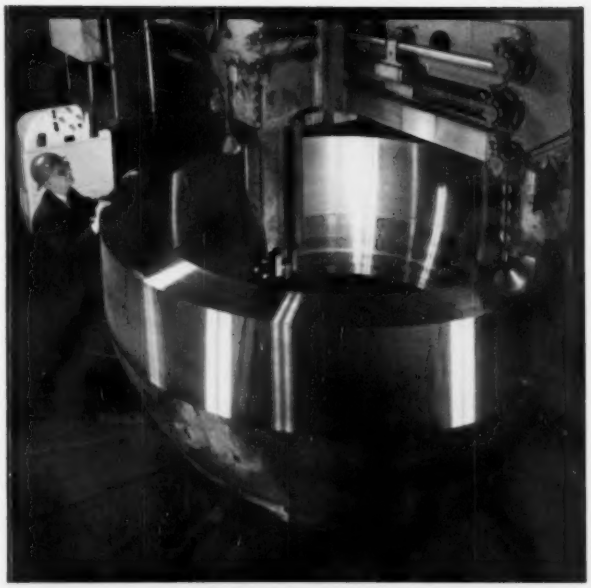
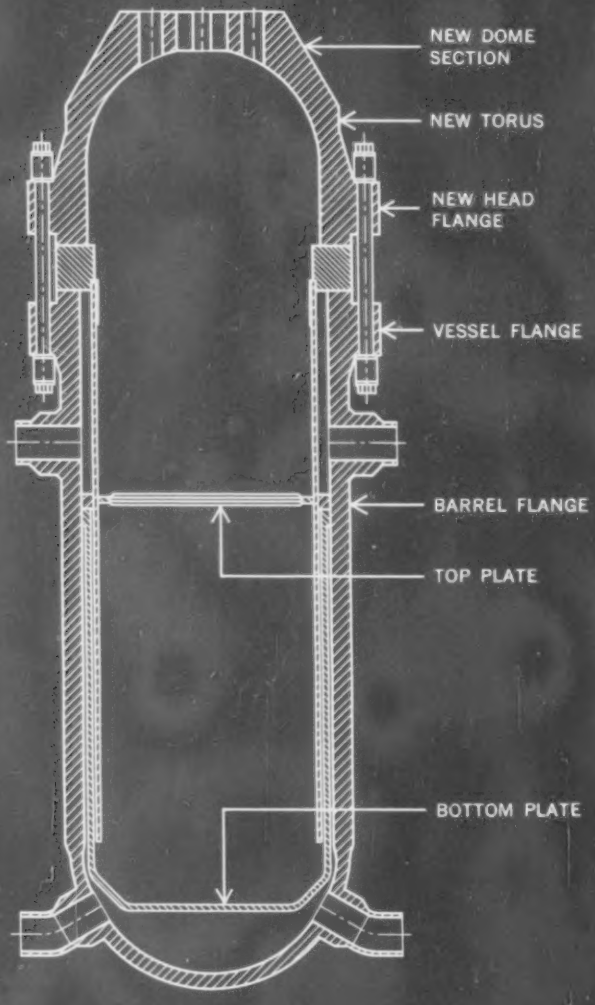


Photos, top to bottom—
lange about to be quenched;
us being contour machined;
trasonic inspection of dome.

Core 2

FORGED COMPONENTS



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s based on the experience of our
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It contains the results of nine years
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the welding of "T-1" Steel.

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strength structural steels. To do
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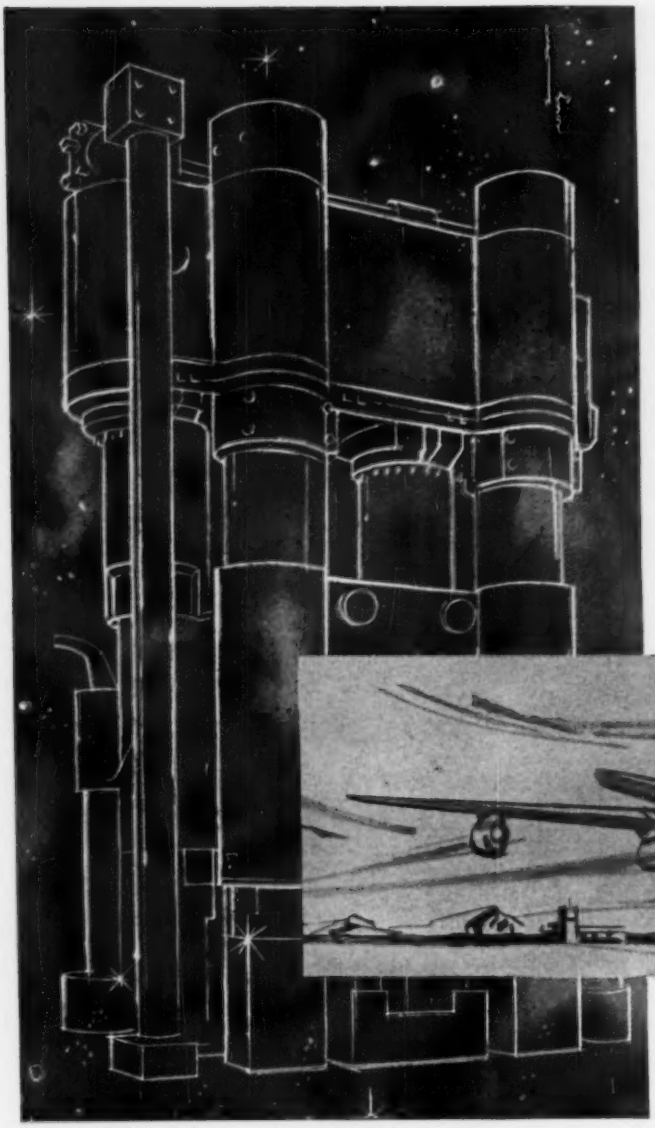
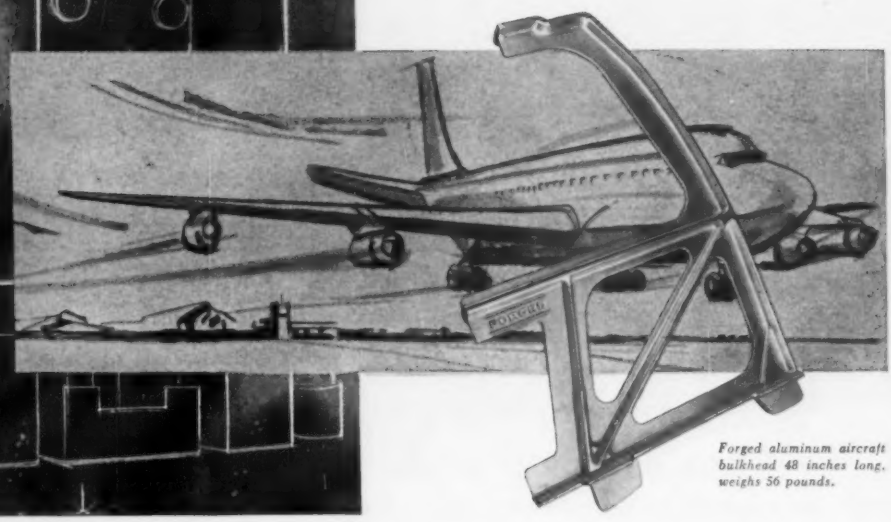


Modern hydraulic forging press exerts 35,000 tons pressure.

HOW FORGED PARTS help airplanes haul bigger payloads



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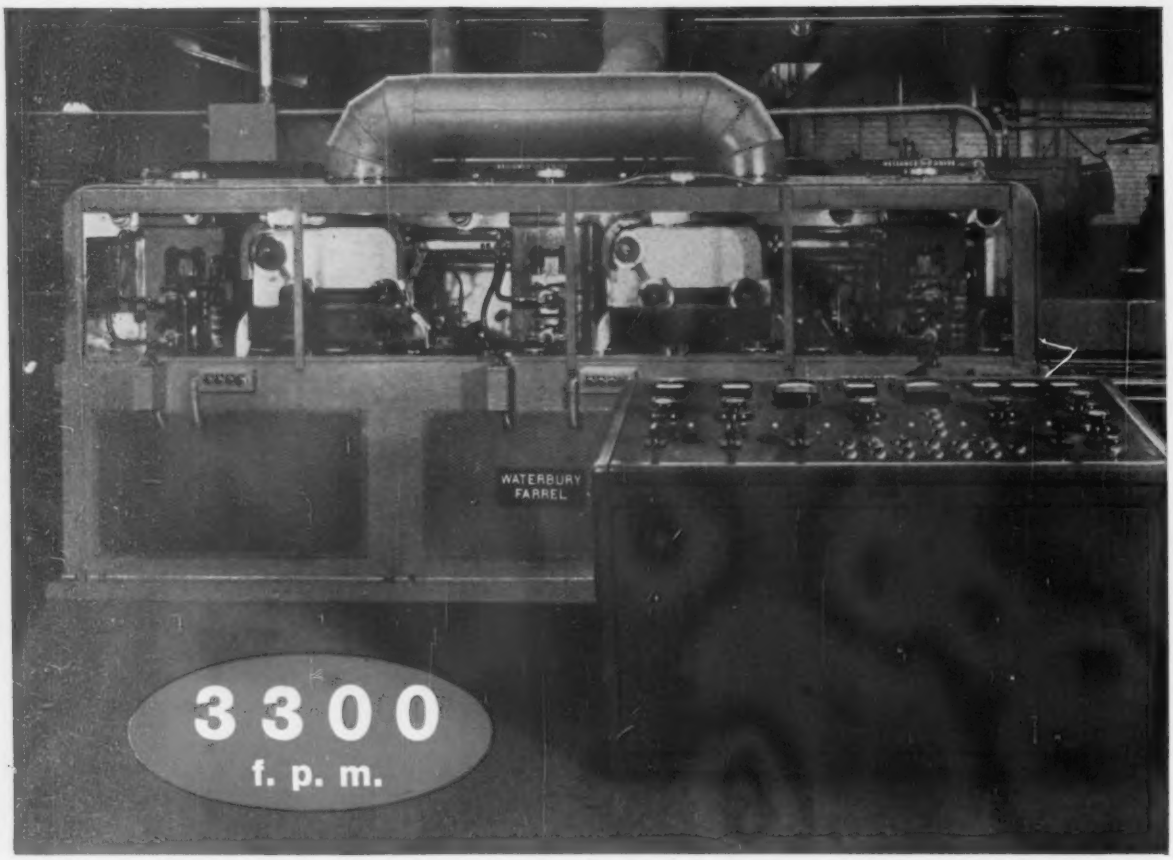

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THE WATERBURY FARREL 3-STAND TANDEM WIRE FLATTENING MILL, pictured above, is rolling close tolerance, high carbon steel wire at the Athenia Steel Div., National-Standard Co., Clifton, N. J., *at speeds up to 3300 feet per minute.* Tolerances are being held within 0.002" on width and 0.00025" on thickness of finished rectangular wire. Modern, cabinet type enclosure of the mill and its coolant troughs keeps the installation clean and facilitates the exhausting of fumes and evaporated coolant.

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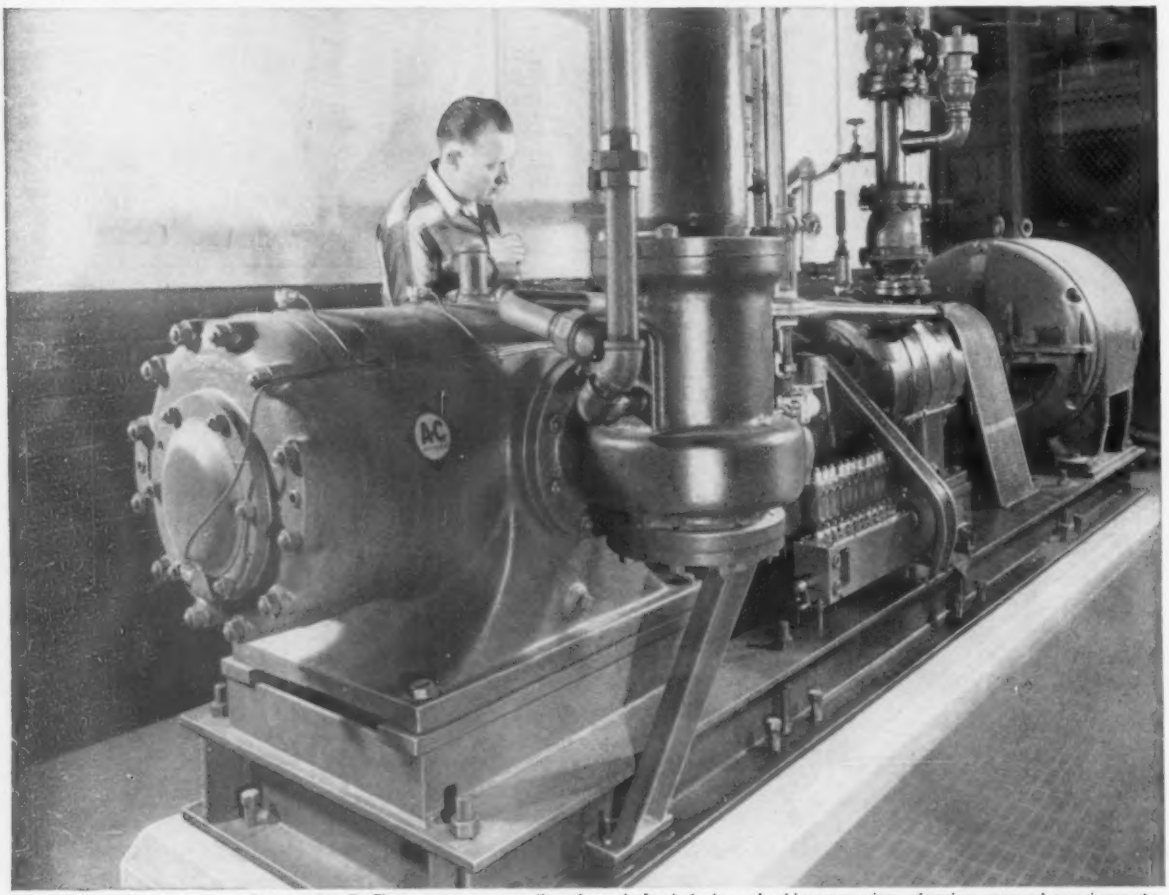

Dependable **Ro-Flo** compressor supplies shop air for indexing, checking, pressing, cleaning, general requirements.

Record-breaking run in Allegan

no new parts for this RO-FLO compressor since installation

With 17 years of trouble-free experience using A-C rotary compressors, Rockwell-Standard Corporation installed this two-stage *Ro-Flo* sliding-vane compressor at their Universal Joint Division, Allegan, Michigan, in January, 1957.

It hasn't let them down. It's been operating 24 hours a day, six to seven days a week, with no major stoppages and no new parts installed since the initial start-up three years ago.

Ask your A-C representative about low-noise, low-maintenance *Ro-Flo* compressors. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wisconsin.

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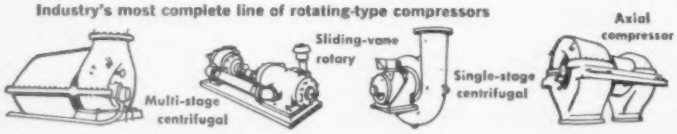

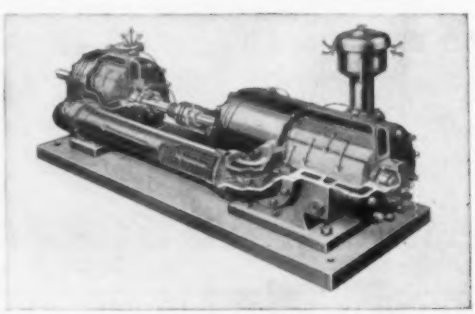

Sliding-vane action compensates for blade wear, helps maintain constant efficiency. Rotary motion cuts vibration and noise, eliminates shock and the necessity for expensive foundations. *Ro-Flo* is an Allis-Chalmers trademark. A-1306

Metalworking Newsfront 6

A NEW MONEY SOURCE FOR CREDIT PURCHASES OF CONSUMER GOODS has opened. The growth of the low-price, compact car market has reduced cash outlays of companies in the auto-financing field. One source estimates the total amount of money now employed in new car financing will shrink by at least 10 pct.

MORE METALWORKERS STEP UP R&D SPENDING. A number of top metalworkers are increasing their R&D outlays at a rate of almost 10 pct per year. One producer of a heavy equipment line, with a gross of over $1 billion per year, has boosted R&D outlays from $5-10 million in 1955 to 5 times that amount in 1960.

CHRYSLER CORP. EXPANDS IN THE REBUILT AUTO-TRUCK PARTS FIELD. The MoPar Div. will distribute remanufactured parts on a nationwide basis. Parts to fit all makes of vehicles will be handled.

LIST THE HOUSEWARES INDUSTRY AMONG GROWING METALS MARKETS. Growth in this industry, among both products and producers, is so great that experts can only estimate its present sales volume at about $5 billion a year. Over 1200 companies exhibited at the industry's last show. Items included wire dish racks, metal cabinets, etc. Sales volume is expected to double by 1970.

U.S. CONSUMER INCOME PATTERN CONTINUES TO CHANGE. While many areas of income lag, the New York Stock Exchange reveals that cash dividends for the first nine months of 1960 amounted to a record-breaking $7.2 billion, up 7 pct over the same period in 1959. The number of individual common stock shareowners jumped from 8.6 million in 1956 to 12.5 million in 1959.

ALUMINUM SUPPLY-DEMAND BALANCE IS NEEDED, according to N. V. Davis, president of Aluminium, Ltd. Mr. Davis foresees Free World consumption of aluminum at 5.5 million tons by 1965. "Free world production," he adds, "could at least equal that total or even surpass 7 million tons if contemplated expansion plans are jumped into ahead of demand."

THE HORSEPOWER RACE ON THE FARM is still gaining steam. New announcements expected in January by farm equipment makers will list some of the most powerful tractors yet produced. The upswing in horsepower will include wheeled tractors. Some of them will outpull the heaviest tracklayers of 2-3 years ago.

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Our National Goals—1

What the President's Commission Reports On—

★ The Future Economy...

★ Changing Technology...

★ The Role of Management and Labor...

★ Foreign Economic Policy...

The President's Commission on National Goals has made its final report.

Its findings and recommendations deal heavily with subjects of direct concern to business.

By E. C. Beaudet

■ Last February President Eisenhower set up a handpicked Commission on National Goals. His objective: To have the Commission "develop a broad outline of coordinated national policies and programs" and to "set up a series of goals in various areas of national activity."

The Commission made its final report to the President this week. While covering many areas of national life, the report dealt heavily with subjects of direct concern to business.

Economic growth, union-management relations, research effort and foreign trade policy came in for substantial review in the minds of Commission members. Depreciation revision and the need for policies to stimulate new capital ventures were singled out for special attention.

Not All Agree—Not all Commission members were in agreement with the final report. Exceptions were taken to the growth argument, tax proposals and organization of research programs for national defense. This was not unexpected. The members (see box, right) have varying political views and professional backgrounds.

So that it couldn't be used politically, the report was deliberately held up until after the national elections. Dr. Henry M. Wriston, in presenting the report, made it clear that the incoming Democratic Administration was as aware of this "nonpartisan" study as the outgoing one.

To assist in the program, the Commission asked the counsel of about 100 specialists in various fields and invited a panel of 14 well-known experts to draw up analyses and recommendations for solving major national issues. But the final report, at times at odds with panel members' views, reflected solely the judgment of the Commission.

Growth Controversy — A main area of controversy among com-

Commission Members

Members of President Eisenhower's bipartisan Commission on National Goals come from all walks of American life. Shown above, they include:

Erwin Canham, editor-in-chief, Christian Science Monitor; Colgate Darden, ex-governor of Virginia; Frank Pace, Jr., Board Chairman, General Dynamics Corp.; Dr. Henry M. Wriston, pres., American Assembly, Columbia Univ.; William P. Bundy, Commission staff director; Crawford Greenawalt, pres., Dupont; James Conant, pres.-emer. of Harvard; Dr. James Killian, pres., MIT; and Gen. Gruenther, pres., American Red Cross. Not shown are: George Meany, pres., AFL-CIO; Learned Hand, retired justice, U. S. Court of Appeals; and Clark Kerr, pres., Univ. of Calif.

Greenawalt: New products.

mission members revolved around the question of economic growth. The Commission set as a goal the greatest rate of growth consistent with the free enterprise system and the avoidance of marked inflation.

It views this growth essential to: A full employment goal, including 13.5 million new additions to the labor force in the next ten years; improving the standard of living; and assuring U. S. competitive strength.

"Public policies, particularly an overhaul of the tax system, including depreciation allowances, should seek to improve the climate for new investment and the balancing of investment with consumption. We should give attention to policies favoring new ventures which involve a high degree of risk and growth potential," the report states.

The Commission found no consensus among economists as to what the growth rate should or can be in the next decade. The report noted that some feel an annual increase of 3.4 pct in the gross national product is possible without extraordinary stimulating measures. Others claim it can go as high as 5 pct.

Reduce Unemployment — But, the Commission points out, the higher the growth rate the fewer economic stimulants will be needed. If the growth rate falls, however, taxes may have to be increased and greater sacrifices called for by forced savings and reduced consumption.

To meet economic objectives unemployment must be kept below 4 pct of the labor force. Lower unemployment and the matching of capacity closer to demand calls for proper management of interest rates, money supply and government budget surpluses and deficits. Greater economic stability could be gained from raising or lowering taxes more readily.

Crawford Greenawalt, president of du Pont, says the Report does not stress sufficiently the **quality of investment** in relation to economic growth.

Meany: Proper leadership.

He feels that the growth rate will be stepped up more by investments in plants producing a completely new product rather than those turning out restyled refrigerators or automobiles. The financing of new and more risky ventures should come from those who can afford to gamble and lose.

Lessen Incentive—High tax rates, he says, tend to discourage such venture capital. And higher personal income taxes lessen personal incentive and weaken the drive at all management levels.

Dr. Clark Kerr, president of the University of California, preferred to state as a national goal a growth rate of not less than 4 pct and, if possible, as high as five pct.

George Meany, president of the AFL-CIO, does not feel that forced savings and reduced consumption are necessary to boost the growth rate over 3.4 pct annually. Given proper leadership, the economy can grow fast enough to meet national goals at home and abroad, he says.

Mr. Meany was sharply critical of a 3.4 pct growth rate.

"I am not prepared to accept this pessimistic approach. I am convinced, as are many sound economists, that the nation clearly can, should and must grow at an annual rate of 4.5 to 5 pct."

Planned Changes—The encouragement of technological change is regarded by the Commission as the most powerful force in advancing the economy. But it should be planned for with due regard for its impact on individuals.

The Report calls for combining the education of workers along with advance planning by industry to reduce technological unemployment. Where reemployment within the same industry is not possible, retraining through vocational programs should be managed locally and financed by state and federal funds.

Threaded throughout the Commission's report is a reaffirmation of the principles of free enterprise and individual rights. In maintaining

NEXT WEEK

Democracy and Economic Growth

How fast can or should the U. S. economy grow in the next two decades? And what effect might this have on our free enterprise system.

The next article in this new series will analyze reports from the Commission's panel members dealing with economic growth and organization.

a democratic economy, it holds the economic system must be compatible with the political system.

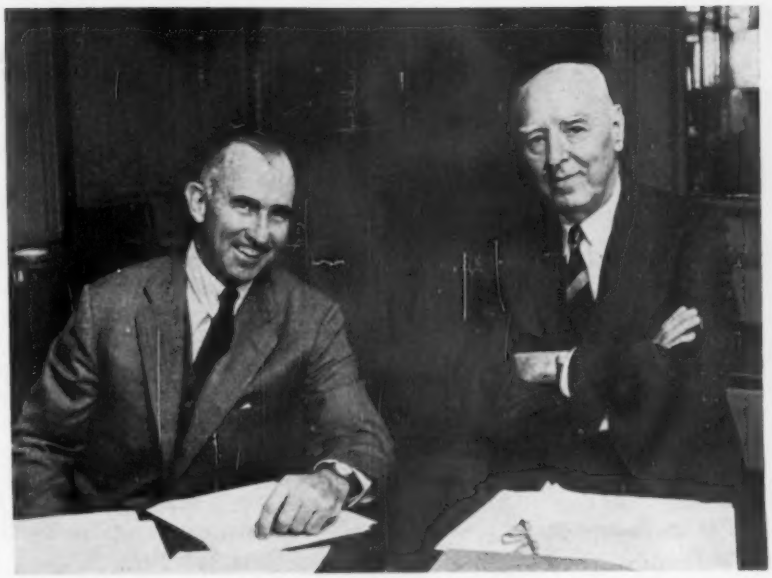
Too much economic power in the hands of corporations, unions or other organizations can lead to abuses and the loss of the productive results of fair competition. Individuals should have maximum freedom in their choice of jobs, goods and services.

Labor Problems — Government participation in economic life should be limited, the report states, only to those areas of national interest or where private agencies cannot meet the need. Regulatory control must be maintained, however, in such areas as anti-trust laws, collusion, and the protection of investors and consumers.

Kerr: Higher growth rate.

In the labor-management area, the Commission called for: The continuance of collective bargaining as the chief method for settling labor problems; Conferences among labor, management and government on matters affecting the entire economy; Limiting the influence corporations and unions exert on the private lives of their members; Lifting of barriers to the employment of women and older workers.

On foreign trade policy, the Commission came out strongly for free trade. It held that the U. S. should work with other nations to reduce trade barriers but safeguard itself against market disruption, destructive competition and national defense.



NATIONAL REPORTERS: Frank Pace, Jr. (left), and Dr. Henry M. Wriston were key members of the President's Commission on National Goals.

Retraining — While countering totalitarian trade practices, the country should continue to seek lower trade restrictions. This may lead to some modifications in present "peril point" and "escape clause" trade legislation. Where this hurts a U. S. industry or community, the Commission recommends government assistance in retraining, relocation and reinvestment.

While he agrees that trade between nations should be at its freest, du Pont's Greenawalt contends we cannot step up the process if it compounds the problem of reducing present unemployment and absorbing 13 more million production workers.

He also points out that our trade problems are complicated by the great disparity in U. S. and foreign wages. Wage rate differences may be as effective in limiting our exports as they are in increasing our imports.

While he does not favor tariffs so high that they bar imports, Mr. Greenawalt feels they should compensate for wage differentials. This would put foreign competition on a fair, competitive basis, he contends.

The Commission's report covered national defense in general terms. More important may be some observations by Mr. Pace.

"Clearly in so vast and complicated an area there are opportunities for improved administration and important savings, and these must be pursued vigorously," he said. He also called attention to other vital areas.

One is the encouragement of revolutionary new ideas in weapons systems.

Another is incisive selection at the "earliest practical time of a new weapons system."

Third, in Mr. Pace's opinion, would be emphasis on the "all-important problem of time lag between the conception of a great idea and its production as a weapons system."

He calls for the Dept. of Defense and Congress to concentrate on improvement of this area.

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Steel's Cost Squeeze Tightens

The second round of steel labor cost increases takes affect today.

Mills are faced with this burden and a new influx of foreign competition. Other factors worry management too.

By G. J. McManus

■ Steel's current cost squeeze moves into stage two this week and the timing couldn't be worse.

The second round of labor cost increases for the industry takes effect Dec. 1.

Hikes come with the mills already hard pressed to break even. They hit with operations at low levels and with no assurance of big gains in coming months.

At the same time, the mills must be ready for a fresh wave of foreign competition. They see no easing of the pressure being applied by other materials. And there is no end in sight for the hungry competition within the industry.

Moreover, the trend in fringe benefits is saddling the industry with a growing number of costs that do not come down as fast as income in a slide.

Cost Bulges—Exact size of the new cost bulge is hard to nail down. Jones & Laughlin Steel Corp. says its labor contract provides for three hourly employment cost increases of 14¢, 11¢, and 14¢. The full contract will add $15 a ton to steelmaking costs, says J&L.

United States Steel Corp. has placed the cost of the basic contract between 3.5 pct to 3.75 pct a year. Applying percentages to U. S. Steel's report of employment costs in the first half of 1959, you get a hike of at least 14¢ an hour each year.

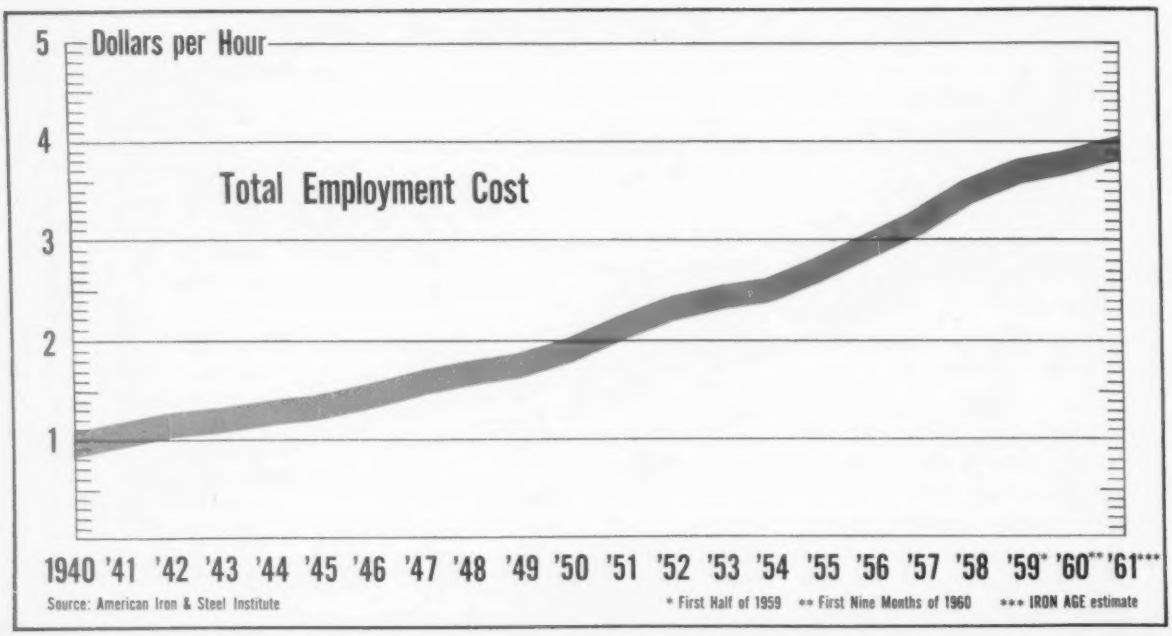
United Steelworkers of America figures wages go up 9.4¢ an hour. This is broken down into a 7¢ increase in basic rates; an average of 1.3¢ in job increments; and 1.1¢ as the impact of incentives.

Bare Statistics—Going by bare statistics, the first leg of the contract boosted employment costs for the industry by about 10¢ an hour. American Iron & Steel Institute reported average employment costs of $3.70 for the first half of 1959 and $3.80 for the first nine months of 1960. Assuming the Dec. 1 increase will have no greater impact than the one in January, the current boost would be somewhere around 10¢.

However, the water is muddied by indirect and delayed costs. The mills must go back 12 months in computing payments for Supplementary Unemployment Benefits (SUB). This means current payments into the fund reflect a high employment period. With working hours now sharply curtailed, a mill can be paying as high as 15¢ an hour for SUB.

Insurance Burdens — Under a

Steel Labor Costs Continue to Rise Rapidly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Dollars per Hour
Total Employment Cost
1940 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51 '52 '53 '54 '55 '56 '57 '58 '59* '60** '61***
Source: American Iron & Steel Institute
* First Half of 1959 ** First Nine Months of 1960 *** IRON AGE estimate

new contract provision, insurance for hospitalization and surgical care is carried by the company six months after a man is laid off. With heavy layoffs, the cost per hour has gone up.

This is part of the insurance hassle being worked out by the companies and the union. The companies say rising insurance costs have eaten up the 3¢ optionally provided for cost-of-living hikes. USW has argued the point.

Little Left Over—But assuming a cost hike of only 10¢ an hour and looking at recent profits, it is clear the mills won't have much left over when they finish paying bills and employees in coming months.

The industry earned about $100 million in the third quarter of this year. It did this with an operating rate between 50 and 55 pct and with shipments of 14.7 million tons. This output required 242 million hours of work or about 17 hours per ton shipped.

If shipping volume in the first quarter of 1961 is the same as in the third quarter of this year and costs are 10¢ an hour higher, overall costs will be up $24 million.

Overseas Wages Up—Mills can take some solace from the fact that steel wages are going up abroad. In West Germany, the current year has seen a general increase of 8 pct for the metal trades and another 4 pct added by local negotiations. With a labor shortage estimated at 500,000, pressure for higher wages has been strong in Germany.

However, percentage figures must be considered in the light of starting points. According to one estimate, foreign mills put only about 20 pct of their sales dollars into employment costs. In this country, the employment cut normally runs between 35 and 40 pct.

A Big Rise?—Steel wages rose 77 pct between 1952 and 1958 in the Netherlands. Over the same period, there was an increase of 52 pct in this country. However, the actual dollar increases were $1.20 against 41¢ for the Dutch.

U. S. vs. Soviet Steel

Report on Europe

This is the sixth of a series of on-the-spot reports by G. F. Sullivan, editor of The IRON AGE, who recently completed his sixth peacetime visit to Europe.

■ If you talk to European businessmen about the Soviet Union you'll occasionally be reminded that the Russians have announced a goal of out-producing the United States in steel by 1970. You get the idea that this will "prove" that the balance of industrial power has shifted to the Communists.

This is an area that involves U. S. prestige overseas; an area that leaves a lot of room for misunderstanding about what industrial power really is.

From the Ground Up—Europeans are beginning to understand one facet of it. Some see their own yearly output gaining faster than that of the United States. They can understand that where there are more unsatisfied needs for things made of steel, then steel output tends to shoot up faster.

What they, like a great many Americans, fail to realize is that even if Russia does out-produce the United States in steel by 1970, she still has a long row to hoe to approach U. S. or European living standards.

Often overlooked in these comparisons is this: The United States has built millions of houses and thousands of miles of highways and railroads, countless industrial plants and bridges and big buildings. Its people have millions of cars, trucks, homes, and labor-saving appliances.

Some 88 pct of U. S. homes have TV sets—which may or may not prove anything.

But all of this does prove something: These things required many hundreds of millions of tons of steel. We have them now. The Russians have only a tiny fraction of the buildings and bridges and cars and trucks and houses—and all the other things that spell an enormous difference in living standards.

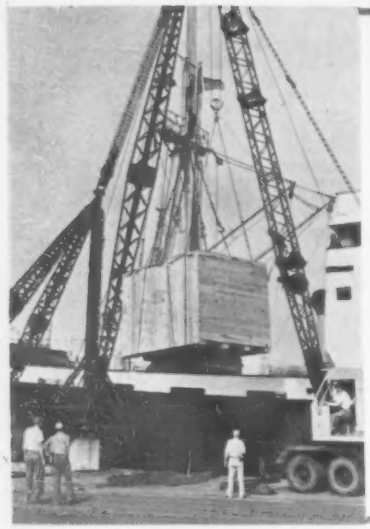
Unlike oil, which is consumed soon after it is produced, steel (or much of it) is a long-term investment. You have to add what is still in use from prior production to what is made in a single year to determine a nation's net worth in steel terms.

By simple arithmetic, the Soviet Union will have to make more steel than the United States for years and years — just to catch up to where we are now.

Suppose the Russians do make as much steel as the United States in 1970. Where are they then? Look at one steel item: the automobile, which every Russian family would like to own. To match U. S. car sales for a single year, the Russians will have to make at least 50 times as many cars as they do now.

If that sounds too flossy, take the tin can. Here the Russians are just scratching the surface; in the United States we open about 42 billion of them a year. (Yes, billion). In between, you can look at homes, highways or helicopters and see the same catch-up problem.

Suppose that in time the Russians make twice as much steel per year as the U. S. does now. Where are they then? They are then in a position to catch up—if they keep at it for years and years. By that time Russia could have the same living standards as America does today. Meanwhile, the U. S. economy will not have been standing still.



Traffic Direction Is Reversed

St. Lawrence Seaway Traffic — Montreal-Lake Ontario

	Upbound		Downbound	
April to October:	1959	1960	1959	1960
No. of Transits*	3,327	3,077	3,224	2,978
Bulk Cargo (tons)	8,875,045	7,258,935	7,689,031	8,893,616
General Cargo (tons)	1,162,103	973,686	513,633	893,900
Total Cargo (tons)	9,947,148	8,232,621	8,202,664	9,787,516
Pct Increase/Decrease 1960/1959		−17.3		+20.9

*Excludes Pleasure Craft

Seaway Activity Trails 1959

The St. Lawrence Seaway ended this season with tonnage slightly behind 1959.

But officials believe many problems have been ironed out and they're optimistic about next year's chances.

■ Despite new problems, the St. Lawrence Seaway's 1960 tonnage will finish close to last year.

The preliminary total through October shows tonnage trailing last year by only .07 pct—18 million tons compared to 18.1 million tons in 1959 for the Montreal and Lake Ontario section.

The biggest setback is in iron ore. Where, last year, ore continued to come into the U. S. during the steel strike to build up winter stockpiles, this year it fell off. Although no commodity breakdown has been compiled, ore tonnage loss is probably responsible for a drop of 17.3 pct on inbound tonnage this year.

The Turning Tide—But a wave of outbound tonnage has almost turned the tide. Outbound tonnage is up 19.3 pct this year with 9.7 million tons compared to last year's 8.2 million tons. Most of the increase is in bulk cargo.

Next year's outlook hinges largely on general economic conditions, especially in iron ore traffic.

Willis H. Crosswhite, traffic service officer, St. Lawrence Seaway Development Corp., says, "We are seeing that the amount of traffic through the Seaway largely depends on how the steel industry is going.

Optimistic Forecast — "It especially affects the incoming shipments of iron ore. For next year we are optimistic because of an expected good year in steel and more Labrador iron ore properties due to open up. There are also very encouraging signs for downbound traffic."

Tonnage during the Seaway's first two years of operation is still expected to fall short of the predicted 25 million ton annual traffic. The prediction was made in 1957 by the United States and Canadian Tolls Committees. They estimated 25 million tons for last year with a steady rise to 50 million tons by 1968.

Last year the Seaway opened late, causing a pileup of ships trying to enter. Water of 27 ft depth was not available until June. A general drop in world trade brought in many tramp steamers seeking cargo and adding to the congestion. Then, to top it off, the steel strike crippled iron ore shipments.

Good Estimates—But a smoother operation this year has given many shippers a good estimate of normal cost and elapsed time expected. So, most are planning big winter studies and presentations to prospective shippers in an effort to sell the Seaway program for next year.

The lack of service to all but a few of the largest foreign ports-of-call is still one of the major drawbacks. Good tonnage of foreign steel left Great Lakes steel centers for Europe this summer. But only a small percentage could be sent the all-water route because shipping arrangements couldn't be made.

Improved service next year should alleviate this growing pain.

Threat of Crisis Hits Silver

Government Stocks Drop as Demand Exceeds Supply

Government stocks, which support market, will be depleted in two years at present withdrawal rate.

Industrial users, now ahead of arts and coinage, are a major market for silver.

By F. J. Starin

■ There may be a crisis shaping up in world silver markets.

Simon Strauss, vice president of American Smelting and Refining Co., which claims to be the world's largest silver producer, warns that unless the U. S. Treasury adjusts its sales policies soon, the price is going to "rise steeply" in 20 to 24 months.

Not everyone in the silver industry agrees.

Industry Affected — No matter who is right, industry is going to be affected. In the last few years, industrial users have passed arts and coinage as the major market for silver.

In 1959, U. S. industry used about 100 million oz. Industry outside the U. S. used 112 million oz. Figures for 1960 will be about the same.

Where is silver used in industry? Major markets include rechargeable batteries, brazing alloys, contact points, ceramics, catalysts, special bearings, in atomic reactors, and even some water desalting techniques.

Demand Exceeds Supply—At no time since World War II, has Free World production of silver matched production. In 1959, output was about 196 million oz while total consumption was about 296 million oz. The market has been running very close to this ratio for a decade.

This difference, to a great degree, has been made up from sales to industry from so-called free stocks of the U. S. Treasury.

Under the silver purchase act, miners get 70 pct of the silver they deliver to the U. S. Treasury back in coin or certificates. The other 30 pct goes into free stocks. The Treasury may sell this silver for consumption in the U. S. at not less than 91¢ per oz.

Government Stocks Drop—Says Mr. Strauss; "At the end of December, 1959, the free stock of silver held by the government was 174 million oz. At the end of October, 1960, this had been reduced to 134 million oz. We expect that by the end of the year this will be down to about 125 million oz."

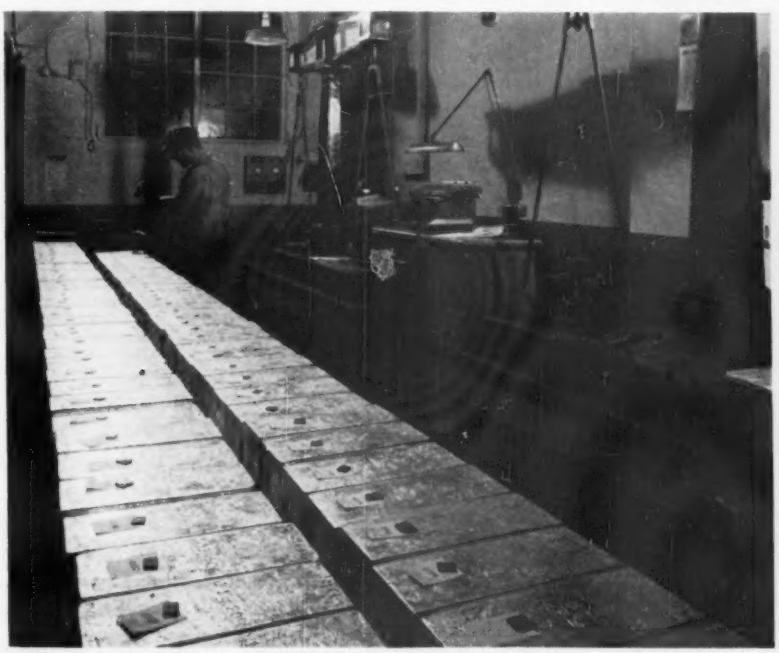
Mr. Strauss points out that government stocks will be exhausted in another two years if withdrawals continue at the present rate.

Production Limited—The Asarco executive also observes that most of the silver produced today is a by-product, mostly of lead, zinc, copper, and gold mining. Because of this, he says, it is not feasible to increase output.

Mr. Strauss contends that once Treasury stocks are gone there will be no prop under the market and prices will rise.

Hidden Supply—On the other side of the issue, it is agreed that $1.29 is the ceiling. But the feeling is the market will not come close to this. "There's a lot of silver not in the ground, and not on the market," says one spokesman. "It's in jewelry, coinage, and just plain hoarded stocks. When the price starts going up, this will come onto the market and keep prices from rising too fast or too far."

Mr. Strauss's solution: The Treasury should use its discretionary powers and permit a gradual, orderly, moderate increase in price.



PROBLEM METAL: Refined silver is inspected and stamped at Selby, Calif. plant of American Smelting and Refining Co.

The Right Consultant Can Help

Small, Growing Companies Lead in Use of Consultants

Your chances of calling on a management consultant grow as business becomes more complex and competitive.

Some consultant-client experiences have been bitter. There are ground rules for success.

By J. D. Baxter

▪ U. S. businessmen last year poured an estimated $475 million into the coffers of some 1830 management consultants. This is about $100 million more than paid for consulting services in 1953.

The likelihood of a company using the services of a consultant increases as business becomes more complex and competitive. Consulting firms are increasing in number about 1 pct a year; their billings nearly 5 pct annually.

In the past, only the largest companies used consultants. But now, more and more medium-size and small, growing companies use these services. Here is how the Assn. of Consulting Management Engineers (ACME) views this trend:

There is a need—"The small company which is growing into a medium-size company, or the medium-size company which is growing into a large company is most likely to need outside counsel. Competition, taxes, and government regulations weigh heavy on it.

"It may not yet have built up sufficient diversification of product, standing in the market, or cash reserves to carry it through economic fluctuations. And the number of high-caliber executives, and permanent specialists it can support is limited."

While most companies that call in consultants are not "sick" companies, they are still companies facing a problem. The solution to this problem is often crucial to the growth or profit picture of the company. This means the consultant selected must be the "right" one for the company and the problem they face. He must come up with the answer.

How well have consultants fulfilled this promise?

A 1956 survey among users of management consulting services revealed that 41 out of 100 users were not completely satisfied. This points out the necessity to select your professional adviser with care. A wrong choice would not only mean wasting a sizeable fee, but the crucial situation is made even more crucial.

ACME has analyzed successful consultant-client relationships and has this to say:

The Proper Role — "From the viewpoint both of the management consulting firms themselves and of those companies that are most satisfied with the services rendered, their proper role is the auxiliary one of providing analysis, information, and advice such as will help management to make better decisions than it otherwise would be able to do."

According to ACME's analysis, there are three key points in using a consultant profitably: Define your problem accurately, select your consultant with care, and work with the adviser in finding a solution to your problem.

Guides to Choosing a Consultant

Robert F. Dick, expert in the management consultant field, lists the following six points as a guide in chosing the right consultant for your company.

Clarify specifically in your own mind what you are going to ask the consultant to do. Open-end jobs, or "come-in-and-look-around-boys" types of assignments are no good.

Consider giving him a limited assignment in one specific area, when using a consultant for the first time. This approach gives time for getting to know one another, and, at a modest cost to you, to appraise your consultant.

Talk to the principals in at least two or three consulting firms before making a final decision. Shy away from firm guarantees. Responsible consultants don't make them.

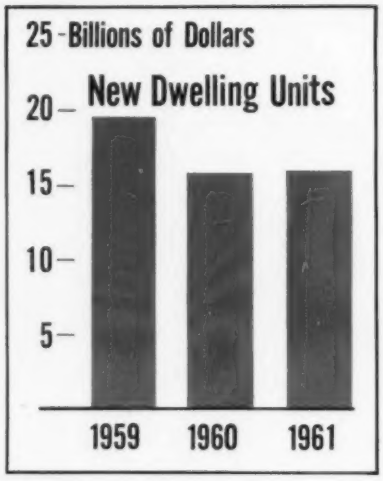
Remember that both small and large consulting firms have their place. Some of the smaller ones specialize in a given industry or in a given function.

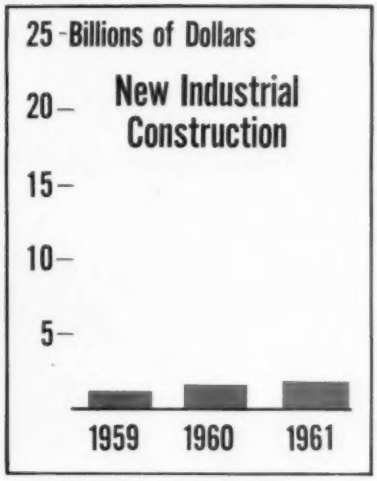
Ask the consultant for recent references on assignments comparable to the one he is going to do for you.

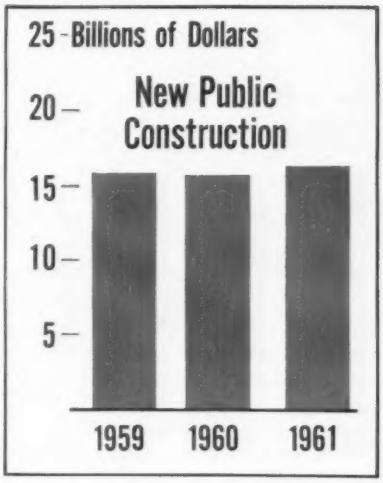
Insist that a written proposal be submitted to each consulting firm interviewed.

According to AMA's Directory of Consultants, there are no bargain rates in consulting work. Rates may vary from approximately $50 a day for a junior to $75 to $100 for a senior, and $200 to $350 per day for a partner.

Expect a "Plus" Construction Year in 1961







Is Slump Over for Construction?

The Kennedy Administration may play a big part in pulling the construction industry out of the doldrums.

Mr. Kennedy's public works programs will insure a big increase in government spending.

By R. W. Crosby.

■ Government action, given a helping hand by President-Elect John F. Kennedy, should pull the construction industry out of the doldrums in 1961.

Forecasts on construction for next year vary with the forecaster, particularly in the important field of home building. But the Dept. of Commerce, which does not make its forecasts lightly, says outlays for all new construction are expected to rise 4 pct in 1961.

Record Coming? — The Commerce prediction would move construction spending to a record $57.3 billion. It would be a $2.2 billion increase over 1960, the first year construction spending declined in over a decade.

The major influence on the bright construction picture is government spending. But less spiralling construction costs, lower interest rates, and more available mortgage money are expected to come in for their share of the credit.

The picture will brighten even more as 1961 moves on. The liberal hand of John F. Kennedy makes latter 1961 and 1962 look like construction boom time.

No. 1 Problem—The President-elect believes the most pressing problem is the domestic economy. It appears that even his hope of a balanced budget will not stand in the way of his plans to stimulate the economy.

Federal programs for construction of schools, housing, urban renewal and other public works will be among the first order of business.

Even minimum Kennedy success, which seems to be assured in the public works area, will mean a big increase in government spending for construction as soon as these programs are put on a working basis. On the administrative side, Mr. Kennedy will seek the creation of a new government agency to keep close tabs on construction and housing.

Early Aid—The new President will help the construction industry even earlier. He will move to lower interest rate ceilings on government-guaranteed housing loans. And he will move to increase the money to back up these loans. Mr. Kennedy hopes to stimulate more home buying through these moves. And home buying appears to need stimulation.

Residential construction sagged badly in 1960. Forecasts for 1961 are muddled. Commerce forecasts a 3 pct increase in home building funds. Private economists in Washington tend to agree.

F. W. Dodge Corp. forecasts a 2 pct increase.

Yet home builders, surveyed by their national association, see no change in 1961. And some private construction experts have predicted as much as a 10 pct decrease. Decreases, however, are based on 1960 trends.

Recovery Year — Brighter predictions for home building and con-

struction as a whole are being based on a "strong recovery" in the second half of 1961, as Commerce says. President-Elect Kennedy says he will settle for nothing less.

Commerce Dept. officials believe the overall construction picture for 1961 will see private funds pass the $40 billion mark and public funds pass the $17 billion mark. Both marks would be record outlays.

Private construction, including housing, public utilities, commercial and industrial building, farm construction, and other nonresidential building, is expected to rise a total of 3 pct.

A Little Better—Industrial construction bucked the trend by jumping 38 pct in 1960. It doesn't look as good for '61. It appears to be in line for only a 7 pct gain next year.

Public construction is expected to jump 5 pct. This includes Federal, state and local outlays.

Highway construction promises to increase $300 million over 1960. Thus, 1961 could match the record $6 billion total of 1959. Less funds needed for right-of-way purposes should make more funds available for highway construction.

Other areas which will bulge the increase are public educational building, public housing starts, and conservation construction.

Same Level—Despite increased spending for missile ground support by the military, no increase in total expenditures for construction are expected by the Defense Dept. next year. Decline in regular military building programs is the reason. Sewer construction is expected to drop 6 pct.

Much of the bright construction picture for 1961 depends on construction costs. Commerce says they will increase, but not at the 1960 rate.

The cost hurdle may be the most difficult to jump. Special danger lies in President-Elect Kennedy's promises to labor. Minimum wage hikes, construction union support, and a better bargaining position for labor may affect costs adversely.

Oxygen Plant at Great Lakes Starts Up

CONTINUOUS BACK-UP: New on-site oxygen plant can supply 500 tons a day of high-purity gaseous oxygen at Great Lakes Steel Corp., Ecorse, Mich. Built by Linde Co., Div. of Union Carbide Corp., the plant's output will be used for oxygen-lancing of openhearths, scarfing and other oxygen-consuming operations. Linde liquid oxygen serves as a continuous back-up of the gaseous supply.

Phoenix Will Close Harrisburg Mill

Phoenix Steel Corp. has decided to close its Harrisburg, Pa., plate mill.

(The Harrisburg mill, with an annual plate rolling capacity of 791,400 tons was the company's only plate mill until it recently bought the Claymont, Del., plant of Colorado Fuel & Iron Corp. The Claymont mill has an annual plate rolling capacity of 300,000 tons.)

The Harrisburg closing, scheduled for Dec. 31, will affect about 1500 employees, Phoenix says.

The company will continue producing carbon steel plate and plate fabrications at the Claymont plant. Concentration of plate rolling there should "materially improve Phoenix's operating ratio and competitive position," according to a company spokesman.

International Harvester Will Make New Car

International Harvester Co. plans to introduce a new, compact, all-purpose vehicle early next year.

Named the "Scout," the new vehicle is said to represent a new concept in low-cost transportation. Design features will include an integral pickup body, a detachable hardtop cab, and detachable doors. It will be available with either two-wheel or four-wheel drive.

Says D. F. Kuntz, divisional sales manager of the company's Motor Truck Division, "In a matter of minutes the Scout can be converted to a completely open model without top, doors, or windows, allowing a wide range of uses from passenger runabout to small pickup truck. It has been designed for family, business, or sportman's use, both on the farm and in the city."

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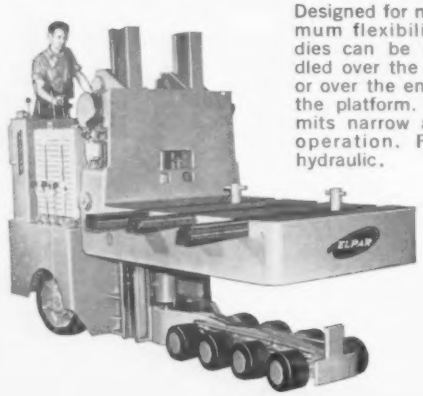

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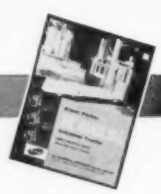

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How to Keep Business Strong

Can individual companies do more to lessen the prospect of recessions?

Yes, says one economist, and it's an area that deserves more business study.

▪ Can an individual company do anything about the business cycle? Can business management take any action against recessions and depressions?

The answer, according to one business economist, is a resounding yes. He's Adolph G. Abramson, director of economic planning, SKF Industries, Inc., Philadelphia.

Program Needed—"It's both possible and necessary to develop an effective business program against the boom and bust cycle," he adds. "The need for a positive business program is clear. Neither government or private business can do the whole job of meeting economic instability."

Dr. Abramson points out more business men should interest themselves in this problem.—"Business must make the effort—or it never will be done," he adds.

Some Ideas—Based on the belief business can take effective action, he mentions some illustrations that show the possibilities. "These are suggestions that have been advanced by others," he says. "They are given only to show the areas where business might act. Each company would have to study its actions individually. Then other courses of action might be indicated."

Included among the proposals are these: Adopt a regular plan for capital spending, with more even year to year spending for new plants and equipment.

More long-range production planning. Try to use relatively long-term measurements of demand and production despite minor sales fluctuations. Plan for changes in business cycles, as well as seasonal movements.

Try to stabilize sales through advertising, merchandising, pricing, new products, and other methods and policies.

Change buying habits in industry generally with the aim of regularizing demand.

Train employees in multiple skills. Adopt long-range hiring policies. Make a conscious effort to hire for permanent employment.

Better Accounting—Adopt new methods of calculating when replacing old equipment or evaluating the gains of new equipment, thus increasing the demand for producers' goods.

Adds Dr. Abramson: "I believe it is necessary for business managers to appraise the general economic situation as a basis for those decisions involving forecasts. However, I believe that even without forecasts something can be done by private companies to combat the boom-bust cycle."

How Soviet Managers Compare

▪ Soviet management methods may have some isolated advantages. But these are more than offset by the wide-ranging initiative of executives in the free world.

This is the conclusion of a report issued by the American Society of Mechanical Engineers, based on the views of top executives, scientists, and engineers. Included were representatives of 88 leading corporations and research institutions in the U. S. and Western Europe.

Bad and Good—Some of the Soviet strengths in speeding practical applications of scientific discoveries: Centralized direction of all national research. Government-sponsored spread of all technical information without regard to competitive conditions or sources.

But analysis of the Soviet system shows several grievous errors, the report notes. "Russian management fails to recognize that one mind cannot possibly pre-guess the outcome of scientific venture. The Soviet tries to combine propaganda with progress. They have a dire shortage of individual imagination. Their scientists have to work under extreme political pressure."

Problems of the West—However, Western management also has its problems, the study observes. The basic scientist does not speak the same language as the applications engineer. "There's need for internal communications within a corporate entity (for) best possible understanding of the link between discovery and use. There must also be an awareness of the findings of all other researchers."

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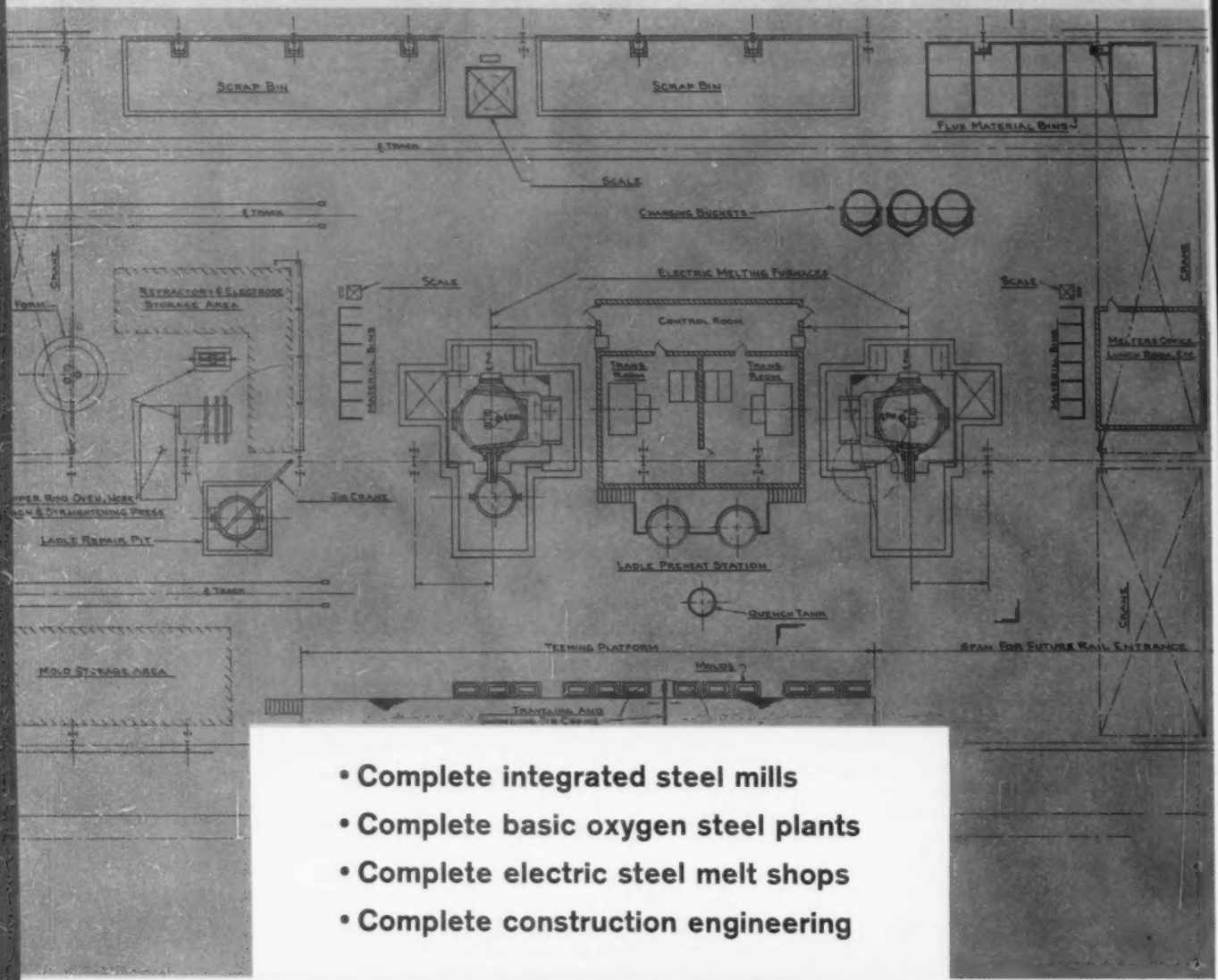

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Automakers Switch to Unit Body

Many More Cars Will Feature It by 1963

The unit body construction technique is rapidly catching on with the automakers.

Replacing body-and-frame construction, unit body output is expected to reach 50 pct soon.

By A. E. Fleming.

■ Unit body construction—where a car's body and frame are composite rather than separate structures—made its greatest advance in the 1960 model year.

It will keep progressing in the 1961 model year mainly on the strength of a growing compact car market, since all compacts have unit bodies.

But the next real surge will depend on when General Motors changes from body and frame construction on regular size models, and when Ford Motor Co. decides to make a similar switch on regular size Fords and Mercurys.

Coming Soon — There is word that Chevrolet, Pontiac, Ford and Mercury will cast off the body and frame technique in favor of the unit body in the 1963 model year. Buick, Oldsmobile and Cadillac would follow in the 1964 or 1965 model year.

But recent developments may have a bearing on such decisions. At two GM plants—in Pontiac, Mich., and South Gate, Calif.—unit body compacts and body-and-frame regular size cars are made on the same assembly line at the same time.

Ford Motor Co.'s Atlanta, Ga., plant will start doing the same thing in December with its unit body Falcon and body-and-frame regular Ford.

Pro and Con—Proponents of unit bodies claim they are cheaper to make than body-and-frame cars. They claim they are stronger and have fewer rattles. They also claim they are safer because of greater impact resistance in collisions.

Those who argue against unit bodies say it must still be proved that they are cheaper to build for large cars, that body-and-frame structure does not cost any more on large cars. They also say they can build a body-and-frame car to perform just as quietly.

In the 1959 model year only 8 pct of U. S. cars had unit bodies; Thunderbirds, Lincolns and Ramblers. The other 92 pct was body-and-frame construction.

However, Chrysler Corp. entered the unit body scene in the 1960 model year, spending millions to give all except its Imperial a unit body. The Chrysler move, along with the advent of Corvair, Falcon, Comet and Valiant, pushed unit body output to 37 pct of U. S. car assembly, the other 63 pct being body and frame.

Going Up—This year other compacts with unit bodies have bowed—the Buick Special, Pontiac Tempest, Oldsmobile F-85 and Dodge Lancer. This means that of the 22 brand names on the market, 13 have unit bodies. Unit construction will approach 50 pct of industry output.

Unit Body Production Is Growing Rapidly

U. S. Car Production by Construction Type

	1960 Model Year		1959 Model Year	
	Body-And-Frame	Unitized Body	Body-And-Frame	Unitized Body
General Motors	2,544,000	250,000	2,674,000	———
Ford Motor Co.	1,069,000	670,000	1,590,000	94,000
Chrysler Corp.	18,000	876,000	704,000	———
American Motors	———	459,000	———	374,000
Studebaker-Packard	126,000	———	131,000	———
Total	3,757,000	2,255,000	5,099,000	468,000

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For further facts, call your nearest Link-Belt office or stock-carrying distributor, listed under CHAINS in the yellow pages of your phone book. Or write for our new comprehensive Catalog 1050.

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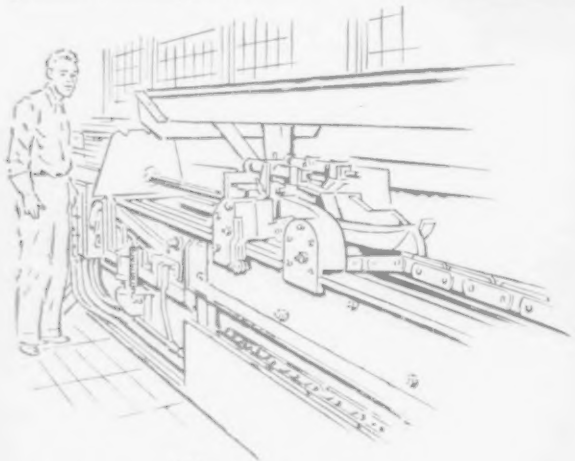
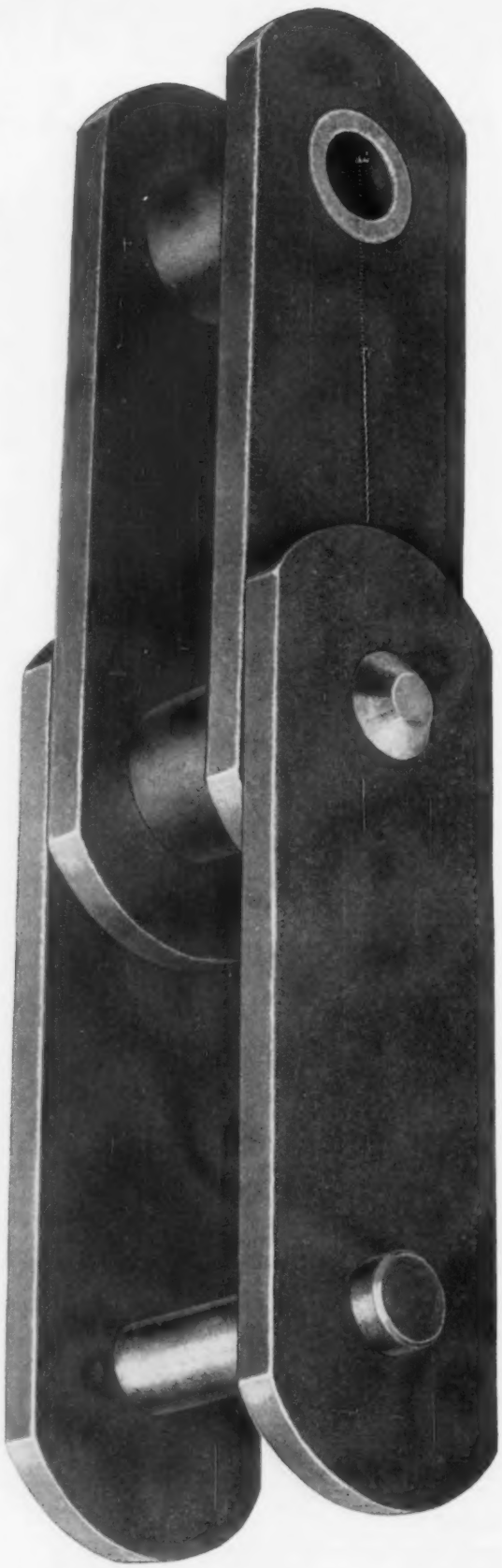




LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

Space Payoff Is Yet to Come

There Are Problems, But It's a Big Market

Though there are still many problems centering around space projects, it's a market that can't afford to be overlooked.

The company that speaks up with solutions is the company that will land contracts.

By R. R. Kay

■ In the race to the moon, the big payoff is yet to come. And metalworkers can't afford to overlook this growing potential.

But there are big problems ahead. The metalworking industry is competent to tackle many of these and come up with the right answers.

Some aerospace experts say that solving these problems is within reach of today's technology. But if you press them, they'll admit there's a lot of tough work ahead.

Where Problems Exist—Tremendous problems exist in structural design, plumbing, pumping, and in handling cryogenic fuels. Navigation is another major concern.

Also, space travel is travel in a vacuum. And experts just don't yet know enough about what happens in vacuums. How to lubricate remains a question. Oils and greases soon disappear in a vacuum.

Metals that on earth slide over one another will seize and score each other in a vacuum. Here is a big field for research into the behavior of materials.

The re-entry problem is also important. Before it is solved, scientists and engineers must come up with materials, parts, and components that can take a beating from high heat, friction, and vibration.

Speak Up — If your company thinks it has any answers, speak up. There's contracts in government research, development, and production available. Check your regional military procurement offices and the National Aeronautics and Space Administration.

Most West Coast major aerospace companies are holders of prime contracts. And they're looking for competent subcontractors.

Spend Research Money

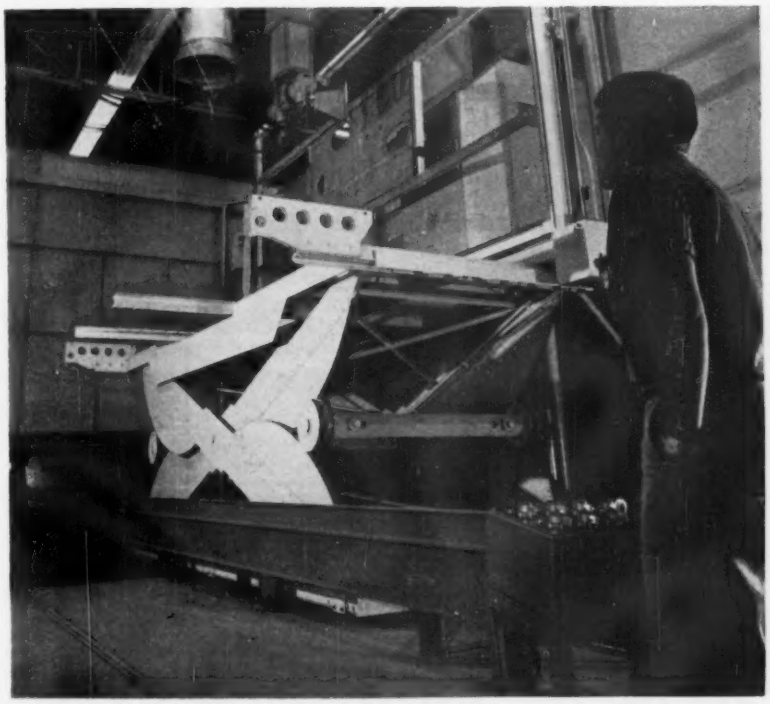
The construction industry chews up over half of the steel made in Farwestern states. But competition from other building materials is making deep inroads.

If this trend continues, the long-range growth picture looks dark for structural shapes, sheet and strip, pipe, and wire.

What to do about it? The steel industry must find new uses for these products. How? Put more money into research.

That's how E. Finley Carter, president, Stanford Research Institute, sees it. He spoke before the San Francisco Regional Technical Meeting of the American Iron and Steel Institute.

It's a Mighty Big Pair of Scissors



FOR INSPECTION: The world's biggest hoist frame for handling honeycomb panels during x-ray inspection is being used by North American Aviation's Quality Control Div. Frame holds panels of the B-70 bomber.

SUN QUENCHING OILS

Keep coolers cleaner longer . . . combine quality with economy

1 Get Low Operating Cost From Natural Detergency

Sun Quenching Oil Light is a naphthenic quenching oil with a natural detergency that keeps coolers clean. One large auto manufacturer reported a cost drop of over 90% in cooler maintenance after switching to Sun Quenching Oil Light.

2 Get Maximum Physicals In Your Steel

Sunquench 1070 is particularly important in fast-quenching operations because it cools at the optimum rate during the critical stage, minimizes distortion, deepens hardness. With Sunquench 1070, you may be able to substitute lower alloy steels for more expensive grades. Exceptional thermal stability of Sunquench 1070 means long life.

3 Get Brighter Parts

Sun Quenching Oil 11 is a premium-quality paraffinic quenching oil designed for work requiring an oil with a high flash point. It is particularly good for bright quenching. Its high thermal stability prevents decomposition and the resultant streaks on bright-quenched parts.

4 Get Longer Marquench Oil Life

Sun Marquenching Oils are dewaxed paraffinic oils made for controlled martempering at temperatures as high as 400 F High flash and fire points keep Sun Marquenching Oils safe. High oxidation-resistance increases their useful life in your quench tank.

TALK QUENCHING with the Sun man. He'll show you how one or more of these Sun Quenching Oils can handle all of your needs. Or write to Dept. IA-12.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILA. 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO

Cancellations Dampen Optimism

GM Production Problems Spell Order Cutbacks

Optimism generated by the recent Machine Tool Exposition appears to be unjustified.

Chief among the reasons is order cancellations by General Motors Corp. This could turn 1960 into a weak sales year.

By R. H. Eshelman

■ Unless there's a late and unexpected surge of orders in the closing months of the year, 1960 will stand as an unfulfilled promise for the machine tool industry.

Optimism generated by the Machine Tool Exposition in September has not been realized in bona fide orders. On the contrary, for the second month in a row, cancellations have been the big news. Nearly $8 million in metal cutting orders have been written off the books after September cancellations of $6.3 million.

GM Cancels Out — Actually, these cancellations may really be postponements of automotive programs. Here is what happened:

Two General Motors Corp. divisions, Chevrolet and Oldsmobile, had water-cooled aluminum engines in the works for 1962. These would have been for standard size cars. However, it is understood that there has been production trouble with the aluminum V-8 engines for their compacts. This may have prompted GM engineers to hold off the additional aluminum engines.

Another Drop—Also, it is said that a trans-axle, scheduled for Chevrolet and Pontiac production on a new transfer line, was dropped.

These three automation lines are believed to represent the bulk of cancelled orders. However, they do represent one good piece of news: It appears that GM has exhausted its bank of transfer equipment available for rebuilding.

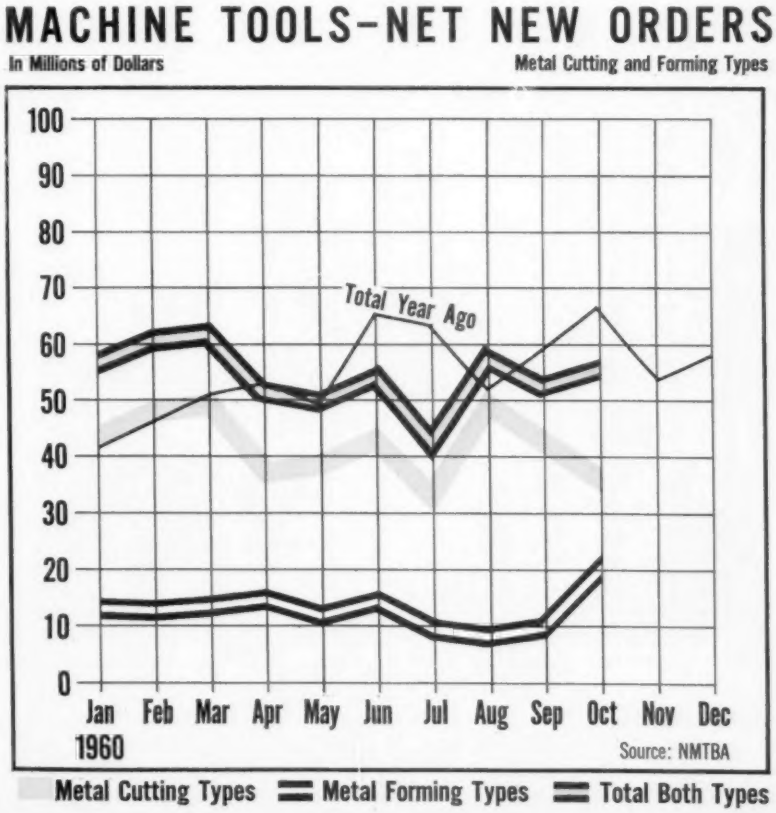
Press Orders Jump—Meanwhile, the jump in metal forming equipment orders noted in the October statistics of the National Machine Tool Builders Assn. can be attributed to automotive buying. Orders total $20.4 million compared to $10.2 million in September.

Most of the Ford Motor Co. order for presses for its Argentine truck plant has been reflected in previous figures. However, Ford is understood to be planning $15 million in additional forming equipment for a bolster press line.

Chevrolet is expected to add some $5 million in stamping facilities, spread over two plants.

Foreign Orders Drop—One encouraging aspect of the tool picture is foreign orders. While metal cutting tools dropped to $9.5 million, down from the year's second high of $16.3 million in September, they are still higher than normal.

In metal forming equipment, foreign orders totaled $3.6 million. So far this year, about 25 pct of the cutting equipment orders have come from abroad. The figure is even higher—about 30 pct—for metal forming machines.



INDUSTRIAL BRIEFS

Big Consolidation—Armco Steel Corp. plans to spend $2.5 million to consolidate its spiral welded pipe manufacturing operations. The company's spiral welded pipe production will be centered at a new fabricating plant in Middletown, O. Two new Driam pipe machines also will be installed in the new layout.

Integration—A new integrated industrial products facility for Autonetics, a division of North American Aviation, Inc., was opened at 3400 E. 70th St., Long Beach, Calif. The new facility includes administrative, marketing, quality control and engineering sections. It will also provide for manufacturing of electronic equipment.

Getting Prepared—The Sheffield, Ala., aluminum casting plant of Ford Motor Co., ordered three 1200-ton diecast machines. The new equipment will be used to diecast transmission cases for Ford and Falcon automobiles when 1962-model production is started in 1961. The plant now manufactures more than 60 different engines and automatic transmission parts for the entire Ford automobile line.

Award Program—For the third consecutive year, the Copper and Brass Research Institute is sponsoring an award program to honor significant new applications of copper, brass, bronze and other copper-base alloys. This year the Copper and Brass Achievement Awards will be given for the outstanding concept or application for the copper metals in two categories — industrial and architectural. Official entry forms are available from the Institute, 420 Lexington Ave., New York 17, N. Y.

Ultra-Modern Plant—A completion date of February, 1961 is set for a new, ultra-modern plant for Atlas Engineering Co. in Roxbury, Mass. The new facilities will include 36,000 sq ft of manufacturing area. The company also plans to introduce diverse product innovations in the near future.

No Deaf Ear to This Tone

MEDAL PRESENTATION: William A. Wissler (right), retired senior metallurgist for Union Carbide Metals Co. Technology Dept., is presented the 1960 Frank J. Tone Medal by Charles H. Emery, chairman, Niagara Frontier Section, American Institute of Mining, Metallurgical and Petroleum Engineers. He was cited for "outstanding professional work."

A New Warehouse—A new warehouse carrying a complete stock of nonferrous and stainless steel fasteners (bolts, nuts, screws, rivets and washers) was opened by The H. M. Harper Co., Morton Grove, Ill. The new building, located at 2615 S. Hanley Rd., St. Louis, Mo., will serve customers throughout Missouri and Arkansas, southern Illinois and western Tennessee.

Overseas Expansion—Minnesota Mining & Manufacturing Co. is planning for the construction of a coated abrasives plant in Australia. The 3M company revealed that its Australian subsidiary will soon begin construction on the new plant. It will be located at the site of the present 3M Australian plant at St. Mary's, New South Wales. Production is expected in early 1962.

Goes Nuclear — Consolidated Electrodynamics Corp., a subsidiary of Bell & Howell Co., acquired the Nuclear Div. of American Electronics, Inc., Culver City, Calif. The technical people and products involved in the transaction will be integrated into regular operations of CEC's Analytical & Control Div. in Pasadena.

R & D Expansion—A new technical service dealing with nickel alloys at elevated temperatures has been established in the Development and Research Div. of the International Nickel Co., Inc. This new High Temperature Engineering Section will serve industry on all problems arising in the use of materials in environments at elevated temperatures.

Millsop Honored—T. E. Millsop, president and chief executive officer, National Steel Corp., has been named by the American Institute of Mining, Metallurgical, and Petroleum Engineers as the recipient of its Benjamin F. Fairless Award for 1961. The honor recognizes Mr. Millsop's accomplishments in behalf of the steel industry, for his support of continuing technical progress in the industry, and for his civic endeavors.

Automatic Bull Block

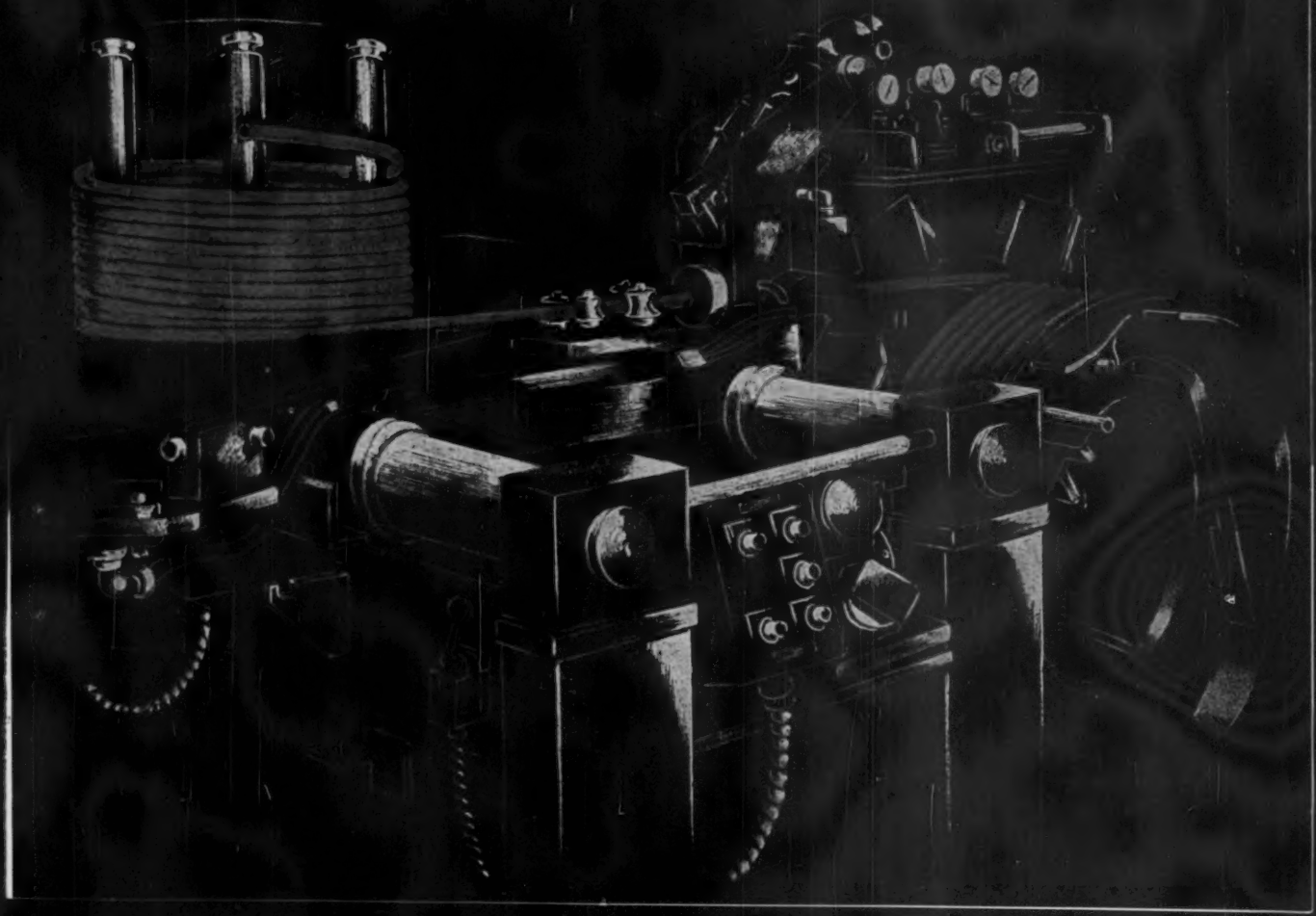
for copper

Place coil in tray and feed point into die. Press the button, that's all. This Automatic Bull Block does the rest. Finished tubing emerges. Features include Automatic Gripping, Automatic Grip Release, Heavy Traverse Feed.

This is a 36" Bull Block drawing down copper from 5/8" to 1/8" at high speeds.

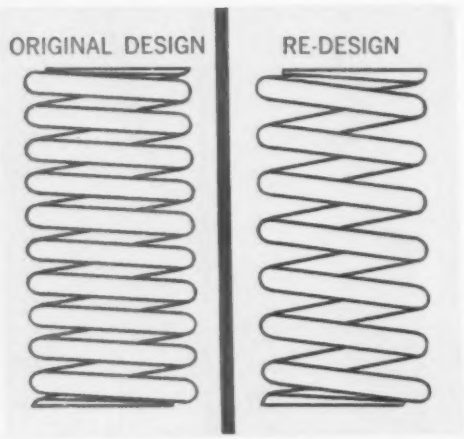
The Automatic Bull Block can be furnished in all sizes up to 84" diameter. Producing long lengths at high speeds automatically really brings down those costs. For complete information on the Block or any other Cold Draw equipment for tubes, bars, or shapes, write to: Cold Draw, Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.

Aetna-Standard Division
BLAW-KNOX



70 POUNDS OF SPRINGS

were just going along for the ride!



10 coils—.120″ wire
130 lbs. of wire per
1M springs

7 coils—.105″ wire
60 lbs. of wire per
1M springs

Because of mounting cost conditions, a user of motor-support springs asked for a complete design check. Redesigned by A.S.C. engineers, required stresses were met by a slight change in wire size, allowing a reduction in number of coils from 10 to 7. This meant a saving of 70 pounds of material per thousand springs. Because of the shorter length of wire, coiling and grinding speeds were increased, heat-treating time reduced. Saving to the customer—40%.

How about the springs you use? A consultation on your specifications costs you nothing. Just contact any Division of Associated Spring Corporation. For a handy reference to spring action, write for "Spring Design and Selection—in brief."

Associated Spring Corporation **General Offices: Bristol, Connecticut**

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y.
B-G-R Division, Plymouth and Ann Arbor, Mich.
Gibson Division, Chicago 14, Ill.
Milwaukee Division, Milwaukee, Wis.
Raymond Manufacturing Division, Corry, Penna.
Ohio Division, Dayton, Ohio
F. N. Manross and Sons Division, Bristol, Conn.
San Francisco Sales Office, Saratoga, Calif.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.

Canadian Subsidiary: Wallace Barnes Co., Ltd., Hamilton, Ont. and Montreal, Que. Puerto Rican Subsidiary: Associated Spring of Puerto Rico, Inc., Carolina, P.R.

N. B. Obbard, appointed executive vice president, international, U. S. Steel Corp.

Warner Automotive Div., Borg-Warner Corp.—**J. W. Holdeman,** appointed vice president, engineering.

American Standard, Industrial Div.—**E. F. Peslar,** appointed vice president, manufacturing.

Raytheon Co.—**C. R. Hammond,** appointed commercial vice president, market development.

The Vaughn Machinery Co.—**J. E. Spearman,** elected vice president, sales, and **M. A. Nye,** as vice president, engineering.

Indiana Steel Products Div., Indiana General Corp.—**P. M. Wheeler,** named vice president and general manager.

Wheeler Service, Inc.—**W. J. McTighe,** appointed vice president and general manager.

Russell, Burdsall & Ward Bolt & Nut Co.—**G. J. Durr,** elected treasurer and director.

Keuffel & Esser of Canada, Ltd.—**T. F. McGovern,** appointed marketing manager.

American Metal Climax, Inc.—**Fritz Wanzenberg,** named systems and procedures manager.

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp.—**R. N. Ames,** appointed technical services specialist with headquarters in the Chicago area.

Stainless and Strip Div., Jones & Laughlin Steel Corp.—**R. S. O'Connor,** appointed division manager, quality and process control, Detroit plant; **W. M. Koenig,** appointed asst. western regional manager, Los Angeles, Calif.; **H. E. Knuff,** named product manager, billets, bars, and wire, Detroit; **T. A. Winnard,** named supervisor, sales and customer services, Detroit plant.

Baldwin-Lima-Hamilton Corp.—**F. H. Norton,** named regional sales manager, east central sales region.

F. W. Knecht, Jr., appointed vice president, Public and Industrial Relations Dept., The Sharon Steel Corp.

Arwood Corp.—**F. W. Dischinger,** appointed midwest regional sales manager.

Bethlehem Steel Co.—**R. S. Hostetter,** appointed manager, industrial fastener sales.

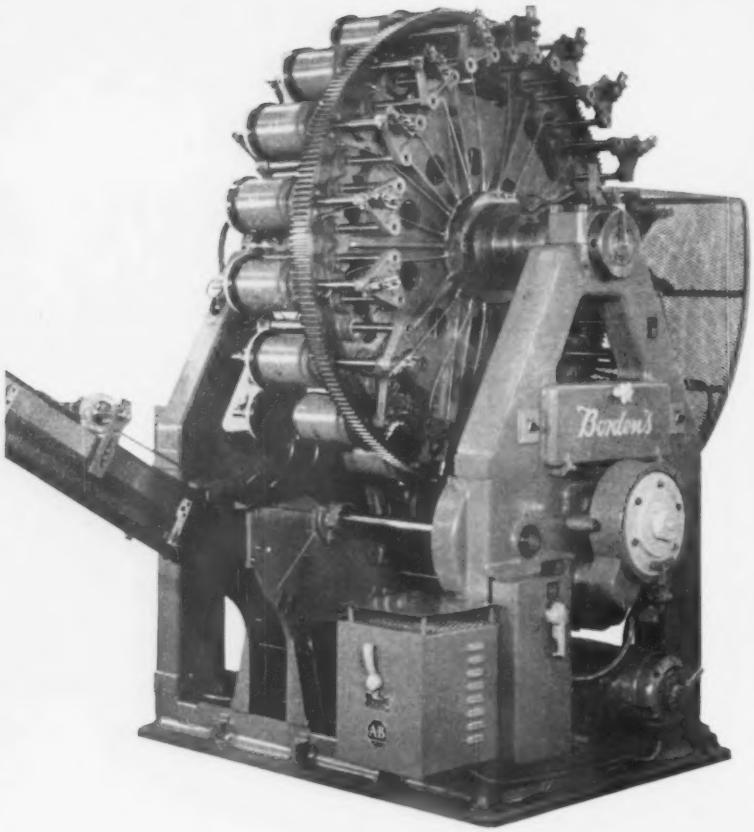
Koppers Co., Inc., Engineering and Construction Div.—**C. H. Sleeman,** named chief mining engineer, Foreign Dept.

Pangborn Corp.—**L. A. Stedman,** named manager, New England dis-

N. F. Tisdale, Jr., appointed executive vice president, Pittsburgh Metals Purifying Co.

K. T. Middleton, elected executive vice president, The Fafnir Bearing Co.

J. R. Parker, elected vice president, automotive and railroad products, A. O. Smith Corp.



MAJOR SOURCE

A CASE IN POINT—The new Borden 18 pocket 4 and 5 quart Can Tester is the first pneumatic tester of this type in the world. Fast, automatic, reliable; it depends on sound, wear-resistant castings for dimensional accuracy and stability. Hamilton Foundry supplies 127 castings ranging from 2 pounds to 1300 pounds for this machine. Borden also makes a 9 pocket Tester for cans up to 2½ gallon capacity. In fact, most of the iron castings used in these machines come from Hamilton Foundry, a reliable single source for engineered castings.

When new and unusual design problems arise in selecting metal and casting parts, the skill and integrity of Hamilton Foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY INC.

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trict with offices in Springfield, Mass.

R. O. Oyler, elected vice president, Bunting Brass & Bronze Co.

C. L. Davis, named vice president and manager, Aeronautical Div., Minneapolis-Honeywell Regulator Co.

American Steel & Wire, U. S. Steel Corp.—**C. A. Ten-Hoopen, Sr.,** and **R. W. Bauer,** appointed assistants to manager, Manufacturers Product Sales Div.

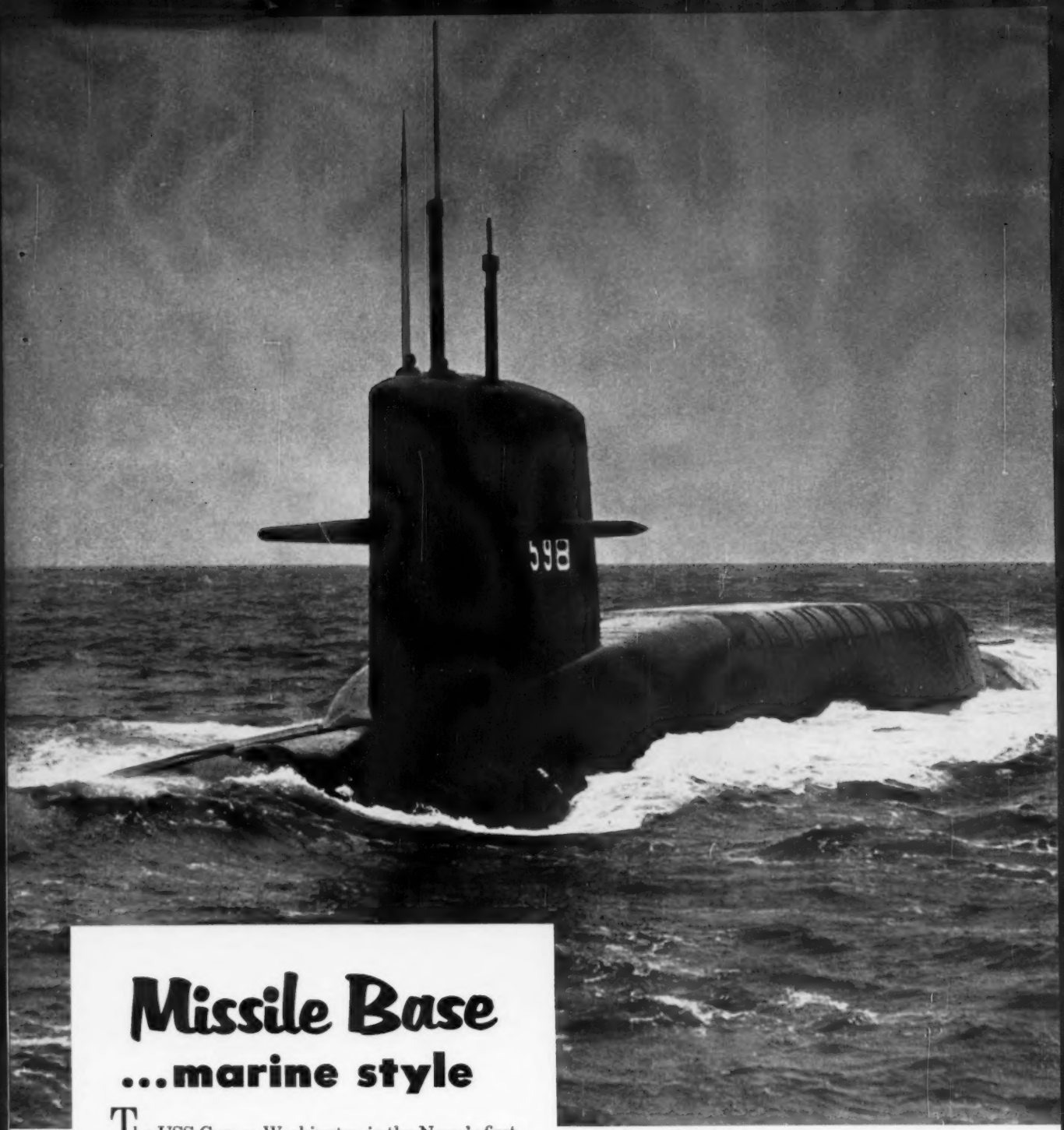
Anaconda American Brass Co.—**P. H. Kirby,** appointed director, metallurgy.

Solar Steel Corp., Cleveland Div.—**A. F. Graham,** appointed asst. manager.

Westrex Corp., Div. of Litton Industries—**S. S. Levine,** appointed manager, marketing planning.

Linde Co., Div. of Union Carbide Corp.—**R. D. Olt,** appointed asst. to sales manager, and **Thomas**

(Continued on P. 122)



Missile Base
...marine style

The USS George Washington is the Navy's first submarine equipped to fire the Polaris missile from submerged positions.

Like the Patrick Henry, Nautilus, Triton, Sea Wolf and other nuclear-powered submarines, the George Washington contains equipment fabricated from stainless steel plate produced by Carlson.

It will be to *your* advantage to specify Carlson stainless steel plate and plate products. Our specialists produce exactly what you want and deliver it to you on schedule. Contact Carlson now.

USS George Washington now "on station" with the fleet!
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Producers of Stainless Steel

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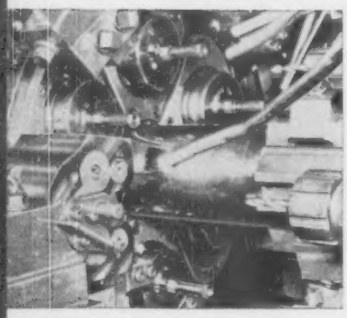
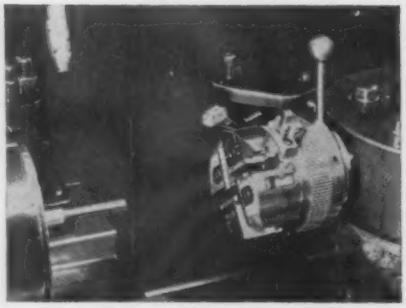
THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

Plates • Plate Products • Heads • Rings • Circles • Flanges • Forgings • Bars and Sheets (No. 1 Finish)

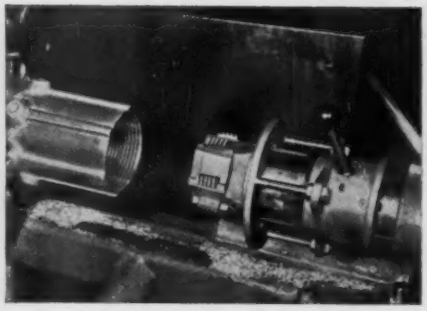
How Landis guarantees



Rolling over 30 million threads

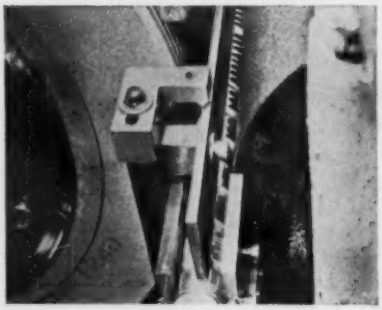


Cutting to .001 concentricity



Tapping coarse threads in less than a minute in one pass

"threading results desired"



Grinding threads 7¼" per minute

The service after purchase each Landis customer receives is his guarantee that Landis equipment will produce threads that meet the degree of accuracy and production for which it was sold.

How does this guarantee work? Since our customers are also our best prospects we provide a multitude of services designed to meet their needs for attention, help and continued satisfactory operation of their Landis purchases.

SALES AND SERVICE REPRESENTATIVES . . . nationwide network . . . factory trained to apply Landis equipment to the most efficient method of operation and keep it performing as such . . . accurate home-office records of customer equipment and operation assures efficient service.

COMPLETE LINE . . . of threading equipment enabling use of machine or tool best suited for the operation whether it be Cutting, Rolling, Tapping, Grinding . . . adequate inventory assures fast delivery.

LITERATURE . . . regular contact by mail keeps customer well informed . . . catalogs and operational handbooks received at time of purchase . . . demonstration movies available.

ENGINEERING ASSISTANCE . . . leading engineers in the field offer help in analyzing and solving threading problems.

NEW PRODUCTS . . . research and development bring even better ways to further meet threading requirements.

QUALITY MANUFACTURE . . . rigid control and fine craftsmanship guarantees threading equipment that will perform with top efficiency, give maximum life, produce accurate threads.

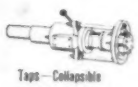
Satisfied customers are our best recommendation. Investigate today the advantages Landis threading equipment has to offer for your plant.

LANDIS *Machine* COMPANY

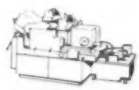
WAYNESBORO • PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

Threading Machines



Taps—Collapsible & Solid Adjustable



Centerless Thread Grinding Machines

Thread Rolling Machines

Die Heads—Rotary & Stationary

Thread Rolling Tools

586C

For Quality and Economy Use

MALLEABLE

For Service Contact..

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Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division, Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

(Continued from P. 118)

Mariner, named southern regional sales representative, Crystal Products Dept.; **L. E. Rautiola,** appointed sales engineer, New Jersey and Pennsylvania, and **C. R. Watt,** as sales engineer, Boston.

M. P. Fedders, named vice president and manager, Boston Div., Minneapolis - Honeywell Regulator Co.

Dresser Products, Inc.—**W. E. Ray,** appointed director, research.

The Fafnir Bearing Co.—**B. N. Claflin,** elected asst. secretary and **E. A. Ingbretsen,** elected asst. treasurer.

Aeronautical Div., Minneapolis-Honeywell Regulator Co.—**W. T. Noll,** becomes manager of Div. operations in Minneapolis and **J. W. Anderson,** appointed manager of the division's St. Petersburg, Fla., facility.

W. B. Connolly, appointed general plants manager, Stamping Group, Chrysler Corp.

Thaddeus Giszczak, promoted to divisional chief metallurgist, Central Foundry Div., General Motors Corp.

Signode Steel Strapping Co.—**G. C. McNown,** named controller, and **M. L. Kilmnick,** elected asst. treasurer.

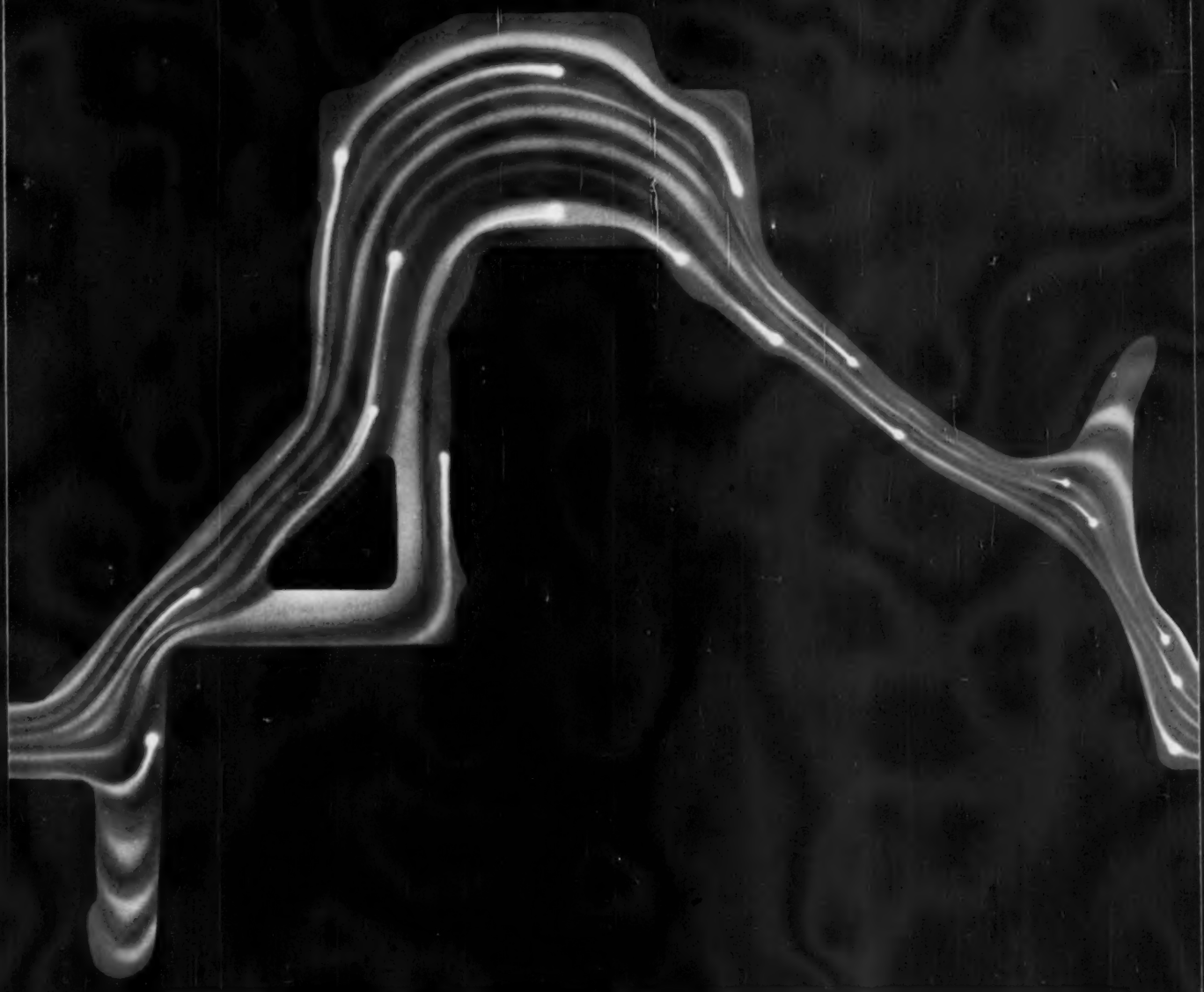
Hunter - Bristol Div., Thiokol Chemical Corp.—**S. H. A. Young,** appointed general manager.

Bendix Filter Div., The Bendix Corp.—**R. J. Raupp,** appointed chief engineer.

Stanley Steel Strapping, Div. of The Stanley Works—**V. B. Chamberlain, Jr.,** appointed national accounts manager; **E. H. Graves,** appointed sales representative, State of Washington.

The Air Pollution Control Div., John Wood Co.—**John von Bergen,** appointed director, industrial sales.

W. E. Littmann, promoted to chief research metallurgist, The Timken Roller Bearing Co.



Liquid flow through a cross section of a Malleable differential carrier.

For Performance-Tested Dependability...Use Malleable

Molten metal flows evenly into all parts of the mold, then solidifies into pre-shaped parts with uniformly dependable properties throughout. Malleable iron castings will stand up under extremes of tension, impact, torsion, shear, fatigue, wear, heat, cold, and corrosion. They also offer maximum economy, are easy to work, and are versatile enough for parts ranging from a few ounces to hundreds of pounds.

The more manufacturers know about Malleable castings, the more they use Malleable to improve quality and increase profits. Get the full story on Malleable ... Contact any of the progressive companies that display this symbol —

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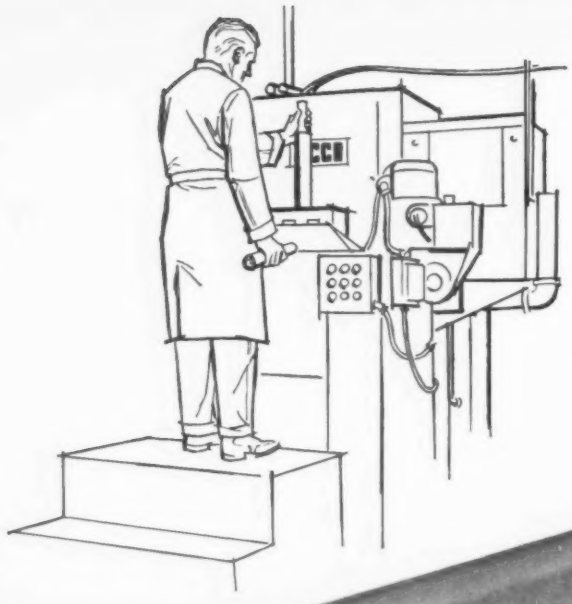
For details on Malleable's uniformity and reliability contact any company listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.



TOCCO Induction Hardening Boosts Track Pin Production 10 Times

The Eimco Corporation of Salt Lake City are producers of heavy-duty earth moving and mining equipment. They recently replaced a low production induction hardening method with a modern, more efficient track pin hardening machine engineered and built by TOCCO for high production operation.

Production Jumped from 208 pins per shift to over 2000 using only one operator. Powered by a 200 KW 3 KC TOCCO motor generator, the new machine produces parts of higher uniform quality with correspondingly better results in service.

Additional Saving is obtained because TOCCO's new continuous roll feed machine does not need center holes in the pins, eliminating two centering operations on each pin.

It will pay you to have a TOCCO sales engineer review your heat treating applications. He can help you boost production and cut costs by the engineered application of induction heating.

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Order Space-Age Metals

Revived defense spending is starting to show up in increased orders for space-age metals. For one producer, orders are up more than 30 pct over the low point this year. The gain takes in the high-nickel alloys for jet engines as well as the lower alloys for missiles. Same producer says special circumstances may be involved but he feels at least part of the gain is due to spending push that recently began.

Bellows Takes 1200°F

Temperatures as high as 1200°F and pressures up to 12,000 psi are no problems for a new metal-bellows design. The new bellows is unique, also, in that it withstands vibration under operating conditions to 2000 cycles per second. An important market is seen in scientific and industrial instruments, and aircraft and missile production.

New Honeycomb Design

Key to the combination of high strength and dimensional stability for a new honeycomb material is its unique design. It consists of cross-laminated layers of corrugated aluminum alloy 5052 foil. The material, which can be fabricated quite readily, takes both light and heavy loads.

Design "Satellite Killer"

The Defense Department is trying to stay one step ahead of itself in space weaponry. Even though they cannot control satellites, government scientists are already thinking of ways to destroy them. The Military is trying to design a vehicle to chase, identify and destroy unfriendly satellites. Proposals for knocking out satellites include using high-frequency radiation, or exploding it with a nuclear weapon.

Study Weld Cracking

A study contract leading to the development of improved welding techniques for certain space-age metals has been awarded to Republic Aviation Corp. The new study is expected to give answers to welding problems that occur in iron and nickel-base superalloys. These metals are in demand because they withstand the high temperatures of supersonic speed. However, they tend to crack during welding, and are now being joined only by mechanical means.

Ceramics Uses Widen

Look for accelerated use of high and low-temperature aerospace materials to be carried over into other industries in the next decade. Uses for special alloys, cermets, ceramic parts and coatings as well as sandwich designs are increasing rapidly, a survey shows. One example is the ceramic-coated muffler for 1961 autos.

What Is Plasma's Role?

Space scientists are taking a closer look at plasma. The role of solar plasma and its effects on the earth are being studied intensively as an essential aspect of success of our space effort. Meanwhile, there's already a payoff in metalworking with development of plasma-arc metallizing guns, plasma-jet contour cutting, and plasma soldering and welding nearing shop utility.

Small Companies Profit

Small companies are also profiting from the high spending for aircraft and missiles. North American Aviation Inc., for example, placed $200 million worth of business with small companies during its 1960 fiscal year. Companies with less than 50 employees accounted for $78 million of this business.

Outlook for Atomic Power

Keep your eye on atomic-energy progress. Not only is the atomic engine proceeding at a rapid rate, but the fluidized-bed atomic reactor is proving out. The combination of centrifugal separation of uranium, plus the initial success of the fluidized-bed reactor, will combine to push down atomic-power costs sharply.

At left, Leslie Edgcomb, Jr., director of purchases for Edgcomb Steel, looks on as Joseph Drexler, vice president and general manager, checks the width of a slit strand.

Edgcomb Steel expands product range and speeds delivery with Wean slitting line

Edgcomb Steel Company, like so many other metal service centers, has noted a continuing trend toward the purchase of metals in coil form by its customers. The increasing demand for aluminum, stainless steel and carbon steel in this form is due to the lower costs realized by metal users through coil processing. Edgcomb has equipped three of its four plants with slitting lines to satisfy this requirement.

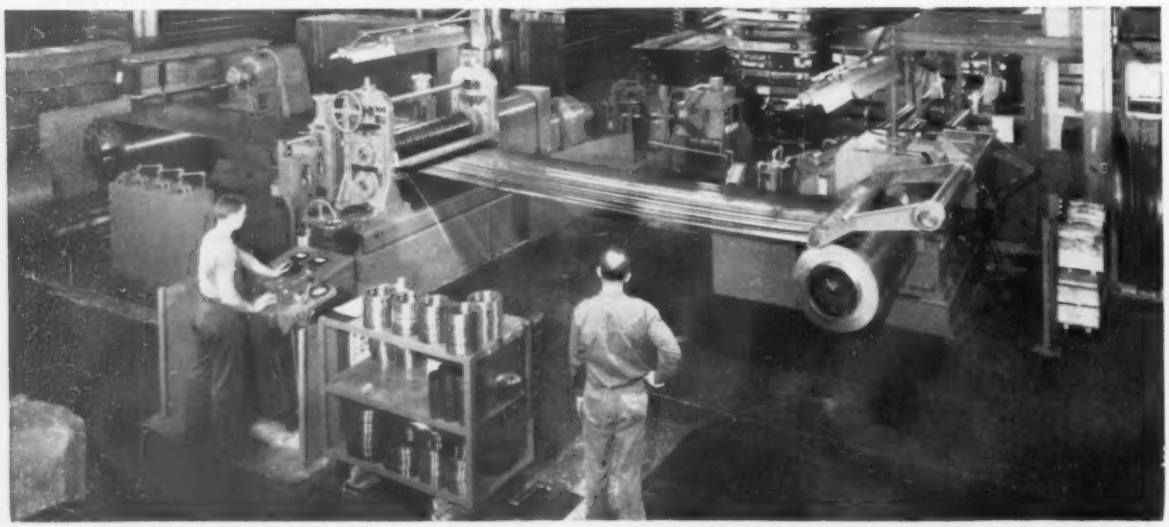
The firm's York plant was set up in 1954 around the Wean slitting line illustrated. Coils, stocked in standard widths up to 48" and gauges ranging up to .125", can be slit and side-trimmed quickly and economically to fill customer's orders for narrower widths. Two sets of knives, one for aluminum and one for steel, equip the line to process both metals at speeds up to 800 fpm.

Wean is a leader in the design and construction of coil processing equipment. Whether your operation involves slitting, shearing or stamping metal from coils, Wean can supply the equipment to do the job quickly, accurately and economically. A comprehensive discussion of these operations is contained in a brochure entitled, "Coil Processing." We will be glad to send you a copy if you will send us your request on business letterhead.

WEAN EQUIPMENT CORPORATION
22800 Lakeland Boulevard
CLEVELAND 17, OHIC

WEAN

Wean slitting line at Edgcomb Steel's York plant makes 22 cuts in mild steel on this run for a customer who will form tubing from the slit coils.



DISTANCE CHECK: Production radioisotope setups call for a close watch on distance to keep films sharp.

Radioisotopes Broaden Field For Non-Destructive Tests

By **Robert Hamlin**—Hamlin Testing Laboratories, Inc., Roseville, Mich.

Use of radiography in inspection is growing. But the potential of atomic methods is scarcely scratched.

What can the new test techniques do for you?

▪ Atomic techniques can fill a much larger role in non-destructive testing than they have to date.

The basic method simply uses radioactive isotopes like x-rays to radiograph part defects. But the equipment and techniques now available have gone well beyond these stages. They are now reliable tools for metalworking plants. In fact, they make radiographic inspection practical for a far greater scope of uses.

With the growing importance of product reliability in fields like nuclear-energy, missiles, space hardware, and electronics, radioisotope inspection is bound to come into its own. Many of the new materials and complex designs will call for radiographic inspection possible only by the new methods.

Checks Stainless—The nuclear-reactor field is already using the radioisotope method to x-ray much stainless equipment, particularly welds, for soundness. For example, the Enrico Fermi generating plant near Detroit has many stainless components four or five inches thick. Iridium-192 and cobalt-60 radioisotope sources were needed to go through the material.

For inspecting large components such as these and others in the field we find the radioisotope camera ideal. It's light and portable. With proper safety-rule observance there's virtually no danger to personnel. Radiographic pictures have been taken in the field with stand-

ard methods using iridium-192 and different speeds of film.

How it Works—The source iridium is sealed safely in the camera, surrounded by a complete lead shielding. At the site, the operator can set up the camera, positioning it near a weld, for example, to be inspected. Then he moves back about 50 feet and cranks the source of iridium out to the very head of the instrument.

This source-tube head is then set at a certain pre-determined focal distance from the weld. The operator exposes the film the required time for the material thickness involved. After cranking it back into the camera, he removes the film and returns to the mobile truck-unit for development. It's a very fast, convenient operation. And it handles jobs which were virtually impossible before.

KEEP YOUR DISTANCE: There are radiation alarms in "hot" areas. In addition operators wear a film badge which is sensitive to radiation.

CLEAN EQUIPMENT: Processing film in a clean darkroom will lend to easier viewing. Dust and dirt sometimes setup false indications.

Wide Range of Parts—The standard technique, in a regular inspection department or testing laboratory, depends on built-in shielding rather than distance for personnel safety. A common method for checking a large number of pieces is the panoramic setup.

To radiograph castings for soundness, inclusions, sand holes and cracks, the operator positions several parts at equal distances around the source camera. He places films on the castings and from behind the shielding cranks out the source tube for the exposure. This multiple-shot method means great savings in time.

With large round objects, such as tanks, and cylindrical vessels, the same principle holds. Here, the source goes inside to radiograph a full circumferential weld in a single exposure.

These methods depend on the fact that radiation behaves like light from an electric bulb. That is, it fans out in all directions. If needed, it's a simple matter to direct the spray of radiation with a lead cone. This kind of focus eliminates scatter and gives very fine detail of smaller areas.

Complements Other Methods—The common gamma-ray source, iridium-192 is sometimes too harsh for certain metals. For magnesium parts, for instance, the energy is too great. Since the amount of rays cannot be adjusted—which is always constant for the source isotope—the exposure is controlled by varying the time.

Radioactive force is measured by curies. One curie means the disintegration of 30,000 particles per second. The amount of curies allowed for exposures is proportional

to the amount of time. Thus, an operator can calculate the proper time for thickness and density of the material.

For magnesium, aluminum and some other materials, the force of iridium proves too great. So an x-ray unit is used instead. Since cobalt provides a greater force, it's used for thicker and denser materials.

Teams With Other Methods—The limitations of radioisotopes mean that they must be used in combination with other testing methods for best results. In some cases, magnetic-particle methods such as Magnaflux and Zyglo are used.

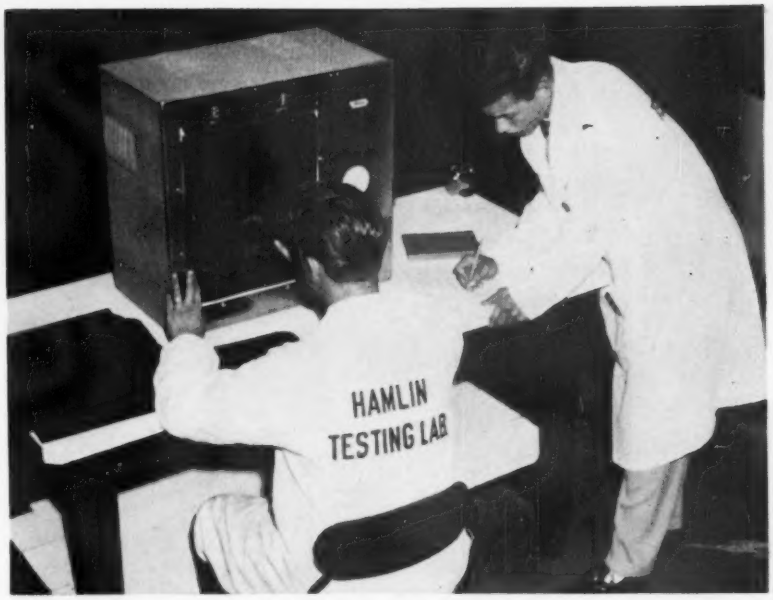
More and more, we find that one needs to check out complete systems, rather than single parts. Specifications for nuclear equipment exemplify this trend. In one instance, a weld was twice x-rayed with radioisotopes the root pass and the final pass. Then a mass spectrometer was used to check the complete piping system to be sure of its integrity.

Aerospace Too—The technique can also be used for space and missile components. It can show up flaws and functional troubles that might develop. For greatest reliability of systems, gamma-ray methods will first be used, then, mass spectrometer checking through high vacuum, and, in some places, ultrasonic tests.

Any method alone has its limits. So the testing laboratory must decide whether one check is sufficient, or whether a combination of two or three is needed to make a complete inspection.

Maintenance Field — One place where the portability of the radioisotope gamma-ray equipment will come into play more will be on many types of maitenance and repair analyses. An example of this occurred recently when some utility piping was blocked off. But which pipes and where they were located was unknown.

With radiography it was possible to take pictures to locate 27 blocked pipes. The film also showed that they were blocked by scale at the top bends.



QUALITY CHECK: Finished radiographs exhibit the internal quality of the parts. Indications are seen due to their density differences.

This type of analysis is more readily done with the radioisotope camera than other methods. Why? Because of its small bulk and comparatively less weight. This same method also shows the thickness of the tube that is left due to natural wear. This requires exposures and calculations, involving triangulation.

Potential for Growth—Thus, the natural development of the radioisotope methods will extend inspection beyond merely telling whether something is sound or flawed. It will allow us, more and more, to put our finger on the nature of the flaw, its exact location and size. By interpolation the dangers involved can be determined.

Another possibility with radioisotope-photographic methods is for analysis of materials. This potential has great significance for design and materials engineering, since engineers are now working much closer to ultimate physicals than ever before.

It will work by comparison of new materials' densities with known ones—such as those of commonly used steels. The kv (kilovolt) value required to go through these and get a picture will be obtained. New metals will be able to be placed in a density category. And the new material which is best suited for a particular design requirement can even be determined.

Safety First—Working with radiation of any kind always brings to the fore the matter of dangers involved. These are carefully minimized today by both federal (Atomic Energy Commission) and state regulations. In fact, because of safety certifications required and practical measures adopted, personnel in a regularly established inspection department or testing laboratory are better guarded against radiation hazards than the man on the street.

There are radiation alarms in the "hot" areas. Shielding is more than adequate. In addition each operator wears a "dosimeter" and film badge. The dosimeter is checked daily and the film badge weekly.

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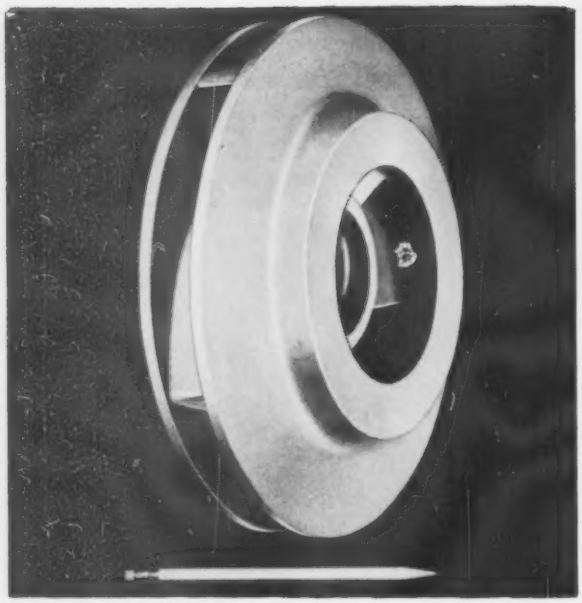
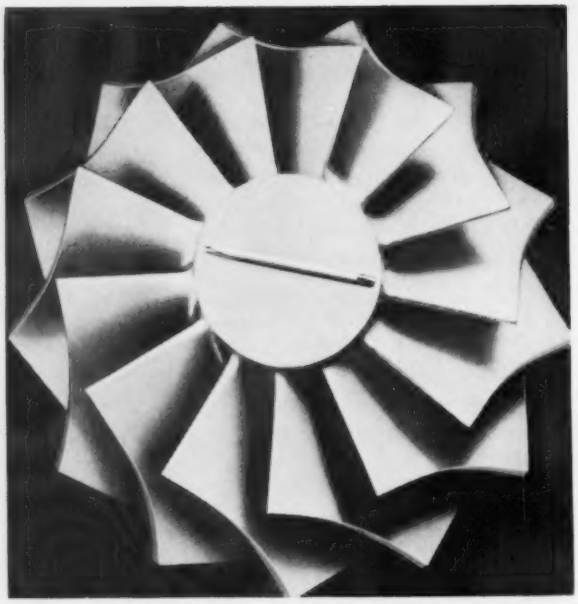


CLOSED IMPELLER: Blade section of this part was made by placing wax-pattern inserts in a core box.



DIFFUSER BLADES: All blades for 450-lb diffuser are investment molded in a single core box.

Two Casting Processes Team Up To Improve Foundry Efficiency

Ceramic-shell molds are easy and inexpensive to make. Investment molds cost a lot more, but they're much more accurate.

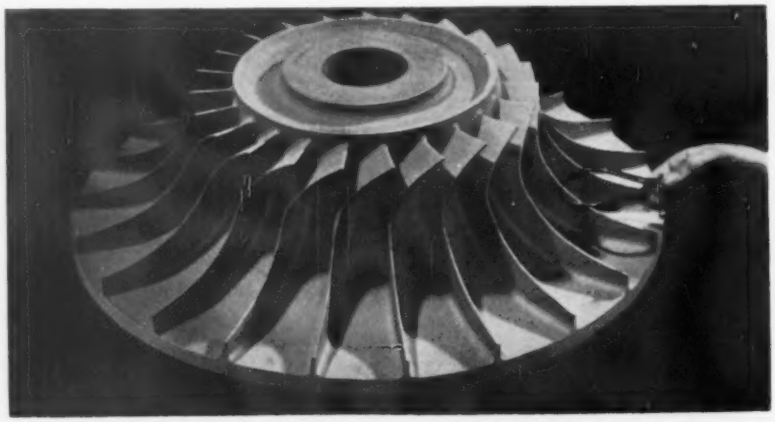
Combine these two processes and you improve casting quality while reducing overall costs.

▪ A combination of two casting processes turns out precision castings in conventional and special-purpose alloy steels. These castings weigh up to several hundred pounds.

The new technique, used at Lebanon Steel Foundry, Lebanon, Pa., consists of two distinct molding methods. One is the Ceramicast process, Lebanon's trade name for the Shaw process of making ceramic molds.

Another stage in this development hinges on investment or lost-wax molding. Both processes are combined within a single casting. Thus, the casting takes advantage of the low-tooling and pattern costs of the Ceramicast process. And it also makes use of the dimensional and tolerance control that's inherent through use of lost wax.

First Stage—In the Ceramicast



THIRD-STAGE IMPELLER: Cast in a low-alloy steel, this impeller was heat treated to high-strength levels. Inducer section is wax invested.

process, a ceramic slurry is poured over a permanent pattern. Each pattern is used repeatedly. After the slurry hardens, it's stripped from the pattern. A split-mold results.

Both halves are next fired in a gas oven. Then, they're joined together, prior to pouring the steel alloy.

While the Ceramicast process has the advantage of low-pattern and tooling costs, it also has disadvantages. Casting contours must be limited to angles or curvatures. This is a must in order to speed the stripping of the mold from the pattern, after the slurry hardens.

Inserts Melt—To combat this restriction, Lebanon sets wax pieces into the pattern or core box. These pieces may be of almost any shape. They can also be quite complex because they don't need to draw after the liquid sets or jells. When the Ceramicast mold is fired, all wax inserts melt out.

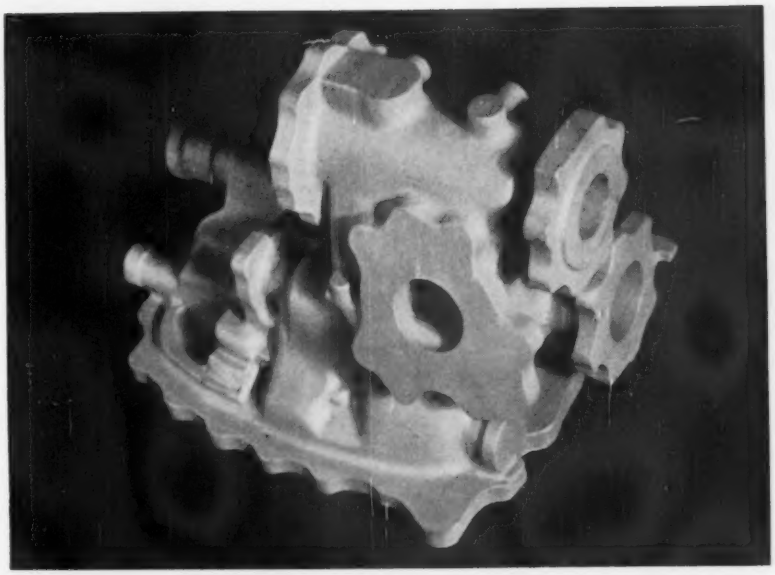
With this dual-stage process, complex impeller and diffuser cores can be accurately cast. Unit-core construction results. This precludes the need for complex core assemblies.

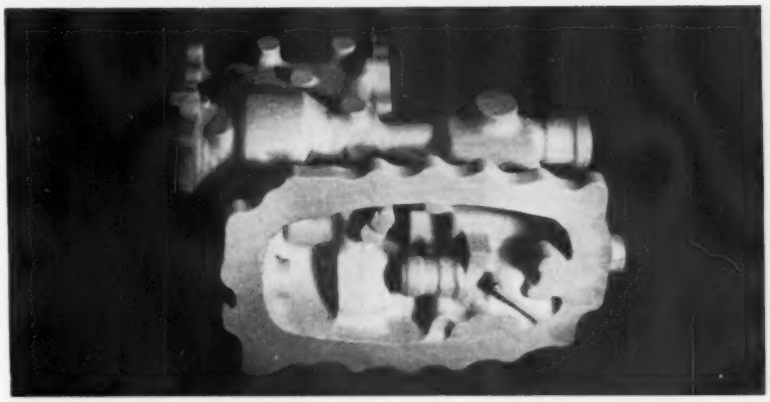
Consider a case in point. A good example is a third-stage impeller. This impeller is cast in a low-alloy steel, then it's heat treated to high-strength levels. In making these castings, the inducer section of each impeller's blades are wax invested.

All straight-vane sections, on the other hand, are drawn from the pattern in the ceramic-molding material. Result is a common mold. This mold is free of joints. It also has none of the dimensional variables that result from using conventional multi-core-assembly methods.

Many Uses—Now, let's consider a closed impeller that's cast in a precipation-hardened stainless alloy. In making the mold for this casting, the impeller-blade section is created by placing wax-pattern inserts in the core box. These inserts melt out when the mold is fired.

Big casting problems centered on heavy diffusers, weighing up to 450 lb. These heavy parts are cast in a stainless alloy. Problems no longer exist. First, the body of the casting is molded by using the ceramic-slurry process. Then the blades are investment molded in one core box.





COMPLEX CASTING: Ceramic and investment molds combine to form a fuel-flow system for new aircraft. Wax inserts permit a unitized mold. Cores aren't required. Dimensional-control problems disappear.

Close control is maintained on the critical areas of the casting. Less critical areas are molded by a comparatively less-costly method.

Another problem involved a fuel-flow system for a modern aircraft engine. This fuel system is also cast in a stainless alloy. The use of wax inserts permits a single-unit mold. This eliminates cores. End result is better dimensional control than that obtained with normal ceramic or sand-molding methods.

Cast Prototype Parts—This combination of ceramic and investment molding is readily adaptable to prototype work. In fact, it reduces both tooling costs and lead time.

In cases where a casting consists of critical and non-critical areas with respect to tolerance control, the dual-stage molding method may be combined with conventional dry-sand or shell-mold parts. The latter being used in the non-critical areas.

In an ideal case, this permits a foundry to combine the best and the cheapest in refractory materials and methods. By selectively applying the desired choices to the casting areas where they're most desirable, it's easy to produce sound castings, with optimum economy.

Alloy Wire Improves Brake Power

Coiled A-286 Metal Helps Bring Jet Planes to a Halt

The brakes on speedy jet planes are subjected to many landing conditions. As such, they must be top quality.

Return springs on many of these brakes are now made from A-286 superalloy wire.

■ The vital brakes on jet fighter planes are constantly subjected to severe beatings. For top performance, these brakes rely quite heavily on their return springs. By making the spring wire from A-286 alloy, engineers are noting better stress-temperature stability up to 1000° F than they can get from any other alloy.

The austenitic wire is now standard material in the brakes of all F4H-1 Mach 2 Navy Intercepter fighters. Another advantage to the wire is its cost; it's half the price of the next best alloy tested. The wire comes from National-Standard Co., Niles, Mich.

What is the function of the wire? When the brakes on an F4H-1 are released, the return springs must separate the stationary stator disks from the moving rotor disks.

According to the manufacturer of the brakes, Auto Specialties Mfg. Co., St. Joseph, Mich., the disks inside the brake change all the kinetic energy of the moving plane to heat in bringing the aircraft to a halt. Heat in the stacks of the disks can rise to 1400°F. The return springs are barely ¼ in. from these hot stacks, shielded only by a thin metal cylinder.

Two Brakes—As made by McDonnell Aircraft Co., St. Louis, the F4H-1 has two brakes. Each brake has six coaxial return springs. The inner springs are made of 0.0915-in. A-286 wire, left-hand coiled into 23 total coils.

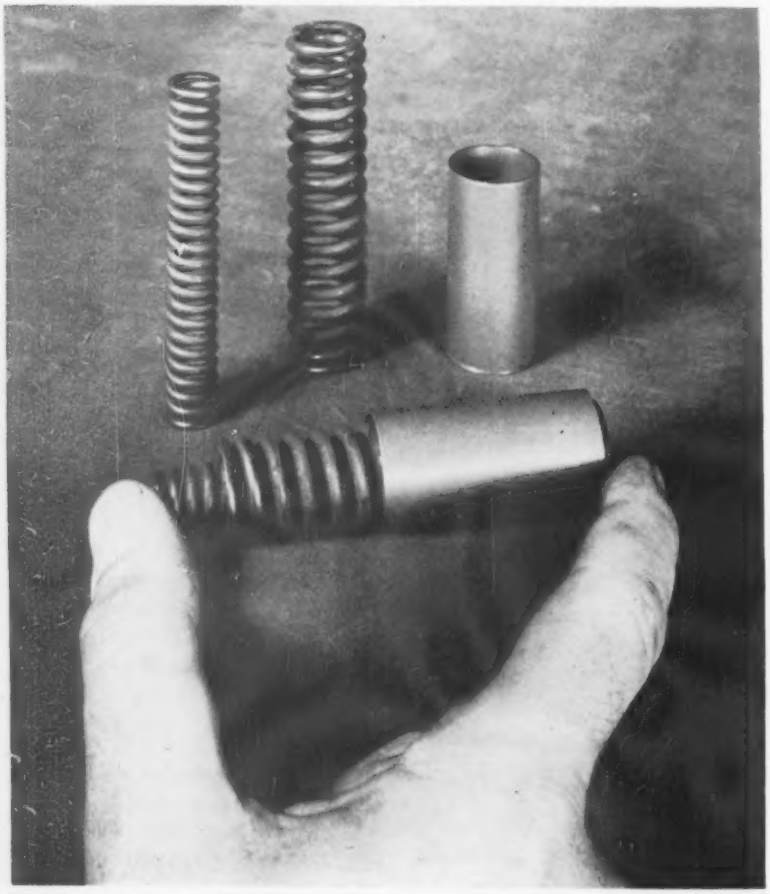
The spring is about ½ in. diam and is 2.167 in. long (fully compressed) or 2.845 in. long at maximum working length. The outer springs are fashioned from 0.135-in. wire, right-hand coiled into 15 total coils.

This spring is about ¾ in. diam. Its lengths are the same as the inner spring's. Tolerance on the spring wire diameter is ±0.001 in.

Part of the 1400°F heat built up in the disks is quickly absorbed by the nearby return springs. This will raise spring temperatures to as much as 1000°F. The springs must retain their strength at this heat to separate the brake disks. If not, brake drag will effect a heat buildup, thereby causing a wheel or tire failure during landings.

Taxi and Takeoff—Taxi runs can be up to five miles long. Takeoff speeds are high. These factors imply greater demands from the return springs. They must keep brake disks from dragging against each other to prevent heat damage during takeoff and taxi duty.

To give the return springs the



SUPERALLOY SPRINGS: Coaxial return springs, made from A-286 wire, separate the stator disks from the rotor disks in jet plane brakes.

desired properties, the right combination of heat pressing, annealing and reduction was required. Engineers realized that fully-annealed wire was the best bet. To prevent galling during automatic coiling, however, 9 pct reduction was chosen to coat the wire surface with a lubricant.

After coiling, the springs are precipitation heat treated at 1350°F for 16 hours. Then the springs are hot pressed at 900°F for two hours. During this period, they are held at a length between solid compressed and the maximum working length. Ends are closed and ground flat within 3°.

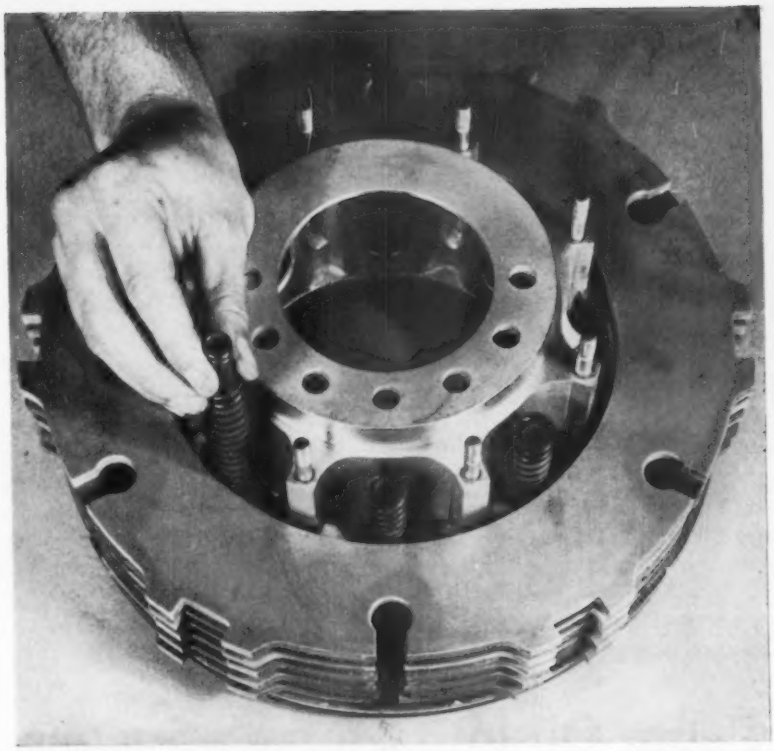
Spring tests were based on three dynamometer tests which simulated the stress-temperature traits of the three landing conditions. Heat builds up in the brakes in 30 seconds and remains for as long as 20 minutes.

Heat Plus Pressure—The springs must work in this heat against a 70 psi back pressure maintained in the aircraft hydraulic system. This back pressure is required because of the operational environment to which the hydraulic system is subjected.

The three landing conditions are normal, high energy and rejected takeoff. In normal conditions, where minimum weight and speed are maintained, return springs must continue to function for 45 landings. High energy conditions require that the return springs operate for five landings. Here, the plane lands soon after takeoff at full gross weight and high speed.

Thirdly, there's rejected takeoff. Brakes are applied just as the plane is ready to leave the ground. The reason might be engine failure. Return springs must handle one of these takeoffs. Stack temperatures reach 1400°F, while the return springs go up to 1000°F.

Tests have proven that A-286 springs can separate the brake disks after being stressed in fully-worn brakes at spring temperatures of 1200°F. Test temperature was maintained for five hours.



IN METAL SHIELDS: Six coaxial springs are encased in protective metal shields and are spaced around the center of the brake disks.

EXACT POSITION: In the fully-assembled brake for the interceptor fighter, the return springs lie between the disks and the axle hub.

Bulk Oil Storage Reduces Costs

By **H. S. Mount**—Mgr. Marketing Engrg., and **I. E. Owens**—Special Rep., Ind. Products, Sun Oil Co., Phila.

Oil costs a lot less per gallon when you buy it in bulk. But bulk-storage installations are a capital expense.

Can you save enough money by buying in quantity to pay for a modern bulk-storage setup?

■ You can reduce your oil costs by as much as 25 pct, if you buy oil in bulk instead of drums. A bulk operation also means less labor, fewer chances of contamination and a reduction in plant hazards.

Bulk oil-storage installations are expensive. However, if you use lots of cutting oils, fuel oils, lubricating oils, process oils, solvents or waxes, you may be missing a chance for major savings.

Pays for Itself—Perhaps you can save enough from bulk buying and handling to pay for a bulk-storage setup. Here's some information which can help you to decide the merits of bulk-storage in your own plant.

To find out how much you can save with a bulk setup, start with the purchase cost of the oil. Check the cost per gallon in drums. Then get the price per gallon for the same oil in bulk.

If, for example, you use 144,000 gallons per year and the oil costs 60¢ per gallon in drums, that's a yearly purchase cost of $86,400. If switching to bulk cuts your cost per gallon to 45¢, you'll save $21,600 per year. This savings can be applied to the cost of a new storage setup.

Since bulk storage also reduces labor costs, you should estimate annual labor savings. Include this figure in the total savings that will result from a changeover.

Other Advantages — There are other advantages to bulk storage, although it's hard to pin point fixed savings for all of them. Contamination and waste are less likely to occur when oil is handled in closed tanks and pipelines.

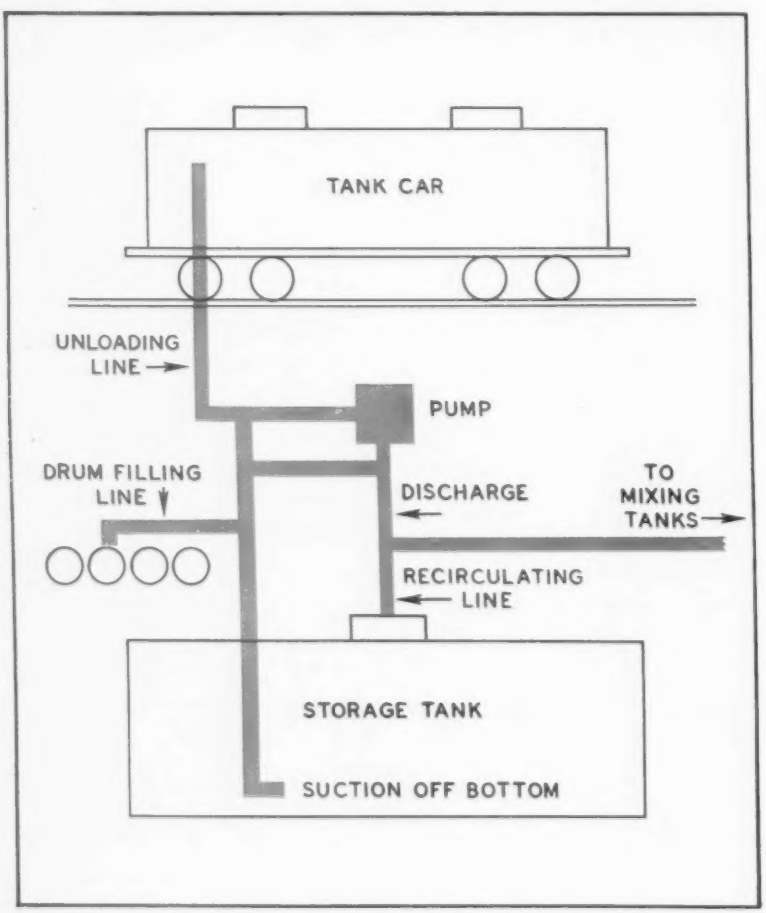
Paperwork and clerical costs tumble because there are fewer inventory records, receiving slips, purchase orders and invoices.

Now, let's consider a major bonus that's inherent with bulk storage. This bonus is safety. When oil is stored in bulk, making drum handling a thing of the past, the chances of fire are reduced.

The cost of a bulk-storage and handling setup depends on the type of oil that you use. Ask yourself three questions. Does the oil require heating? How much storage capacity is needed? And how much piping and pumping equipment will have to be installed.

Keep it Flowing—Remember, oil viscosity is important. It depends upon the lowest temperature to which tanks, piping, pumps and other equipment will be exposed.

Pump Oil Into Storage System



Slugs of cold-thickened oil prove almost impossible to move. Therefore, the setup must keep the oil above its minimum operating temperature at all times.

Don't forget that moisture can affect the oil. Some oils readily absorb moisture. If you're using such an oil, dehydrating tank vents may be needed to prevent air from entering the tank as the oil level drops. Other setups require equipment which removes all moisture before the oil reaches the point of use.

Certain oils tend to separate during storage. This is especially true of the emulsifying types. These oils should be recirculated or agitated by air or mechanical means.

Heat May Be Needed — For proper flow, oil must be kept at a viscosity of 2000 ssu or lower. Thus, heat is a must for some oils. Steam, hot water, hot oil or electricity can serve as the heating source.

Hot water acts as a good medium when close temperature control is needed to avoid charring or discoloration of the oil. But if water or steam is used, a leak in the heating equipment can contaminate the oil. Hot oil precludes contamination problems.

High-pressure steam isn't desirable because of its high heat. Low-pressure steam, about 15 psi or less, is commonly used.

Electrical heating proves costly, but flexible. These heating elements can be used to advantage to heat pipe lines where pumping is intermittent.

Oil in a stock tank can be heated by coils inside the tank or by a heat exchanger. If the oil must be kept at a constant pumping viscosity, pipe coils should be considered. In such a case, it's also a good idea to insulate the tank.

Storage Tank—Your tank should hold 50 pct more than the capacity of the delivery vehicle. This provides insurance against shutdowns caused by lack of stock.

Underground tanks often accumulate condensed moisture from the air. This is due to the surrounding earth's lower temperature. Moisture buildups are most likely to occur in warm, humid weather. For this reason, above-ground storage is preferred in all cases.

WASTE BREEDS WASTE: Oil, purchased in drums, takes up vital space. Each drum requires separate handling while posing a distinct hazard.

In some localities, there are regulations governing the installation of storage tanks. Usually, these rules don't apply to industrial oils because of their high flash points. However, a quick check prior to construction prevents embarrassment and wasted expenses.

Pumps and Piping—Selection of the pumping equipment depends on the viscosity of the oil during the pumping cycle. In most cases, a positive-displacement pump is needed. Gear and screw types work well with extremely viscous oils.

Vane-type pumps handle most grades of industrial oils with good results. All vanes should be spring loaded or equipped with push rods.

Positive-displacement pumps must have by-passes that are large enough to take the pump's full capacity. If there's no by-pass, then the pump itself should incorporate a device which varies the displacement. An ordinary relief valve isn't good enough to properly protect the pump and the motor.

Centrifugal pumps shouldn't be used unless the oil's viscosity is less than 1000 ssu. These pumps can't handle viscous liquids. They don't produce sufficient vacuum, on the suction side, to bring the oil to the pump under conditions that are normal in industrial-oil installations.

Motor Rating—The size of the pump and the motor's horsepower depend on individual operating conditions. Under most conditions, a 5-hp motor is more than sufficient.

Sometimes dual pumps are worth considering. They're most useful if the tank's filling rate and draw-off rate vary by a wide margin.

When a tank is to be filled by gravity, the filling rate should be fast enough to avoid demurrage charges on the delivery vehicle. Gravity-feed lines less than 4-in. diam aren't recommended.

All suction lines must be as short as possible. Discharge lines aren't as critical. However, the size of the discharge lines affects the efficiency of the pump's motor. Thus, they should also be as large as possible.

Rolling of Beryllium Sheet Takes Special Technique

By **B. H. Hessler**—Metallurgist, Beryllium Corp., Reading, Pa.

Despite many desirable properties, wider applications for beryllium have been hampered. The delay lies in sheet-making problems.

A technique, involving cladding and cross-rolling, is now proving successful.

▪ Much has been written about the desirable properties of beryllium. Certain of these make it an ideal construction material for nuclear reactors. Its high modulus of elasticity, high melting point, and good oxidation resistance also attract aircraft and missile designers.

MAKE LARGE SHEET: Beryllium can be hot-rolled into sheet. Beryllium Corp. technique resulted in this sheet measuring 84 x 24 x 0.040 in.

Difficulty in fabricating large, sound, beryllium sheet in the past, has hindered its use. But progress is being made. The Beryllium Corp. finds the following technique successful.

Start With Slab—Raw material is normally a hot-pressed beryllium slab made of powder. This slab is then machined to the dimensions required to make the final sheet.

To assure a high quality sheet, the slab is carefully inspected by X-ray, ultrasonics, and Zyglo before rolling. This step eliminates the chances of cracks, or low spots, in the final product.

Before rolling, the slab must be clad to protect the beryllium from oxidation at rolling temperatures. Cladding also provides edge restraint which tends to keep the slab in compression during rolling. Thus, it prevents cracking due to beryllium's low ductility.

Cladding Must Deform—Selection of the cladding material is important. The material should be cheap, easily machined, easily welded, and easily removed from the beryllium after rolling. Another point is that the cladding should deform at about the same rate as beryllium at the rolling temperature.

Mild steel meets most of these requirements. Normal cladding techniques incorporate a picture-frame design. The beryllium billet is placed in the picture frame. Top and bottom cladding plates are then welded to this frame to complete the assembly.

Rolling of the steel-clad beryllium

slab is done on standard hand-fed sheet-rolling equipment. (The technology of beryllium is not developed to the stage where modern continuous strip mills can be utilized.) Either a 2-high or a 4-high mill can be used.

Rotates the Sheet—The general procedure is to roll the billet to a length which will become the final width of the sheet. The partially-rolled assembly is then rotated 90° until the finished gage is achieved.

This method of cross rolling produces similar properties throughout the plane of the sheet. They could not be achieved in unidirectional rolling because an undesirable crystallographic orientation results.

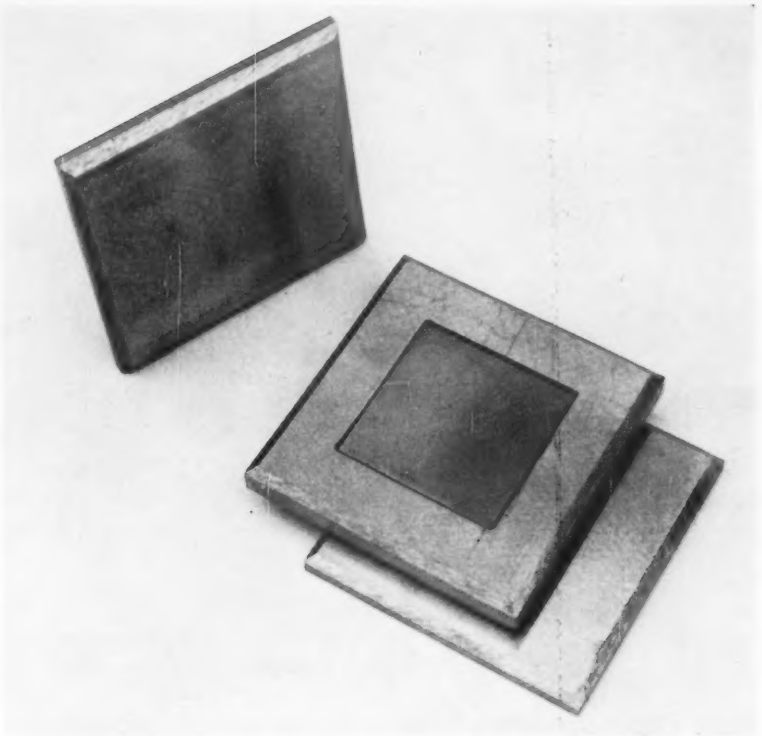
Close control of rolling temperatures is needed to give the required mechanical properties and surface finish. Rolling is usually carried out in a range of 1400°-1500°F.

Beware of Grain Growth—Much higher temperatures tend to cause grain growth in the beryllium. Result: deterioration of mechanical properties and rougher surface appearance. Lower temperatures may cause cracking of the beryllium during rolling.

Reductions per pass are usually about 10 pct. Beryllium can tolerate reductions up to 33 pct in thinner gauges. Heavier reductions, however, tend to produce more of an orange-peel finish on the sheet.

After rolling the assembly to final size, one is still not assured of having a crack-free beryllium sheet. The coefficient of expansion of steel is less than that of beryllium. This condition produces high tensile stresses in beryllium during cooling when it is bonded to the steel.

Must Cool Slowly—Proper cladding design and the use of parting compounds alleviate this condition. However, it's still necessary to cool the assembly slowly and to allow the beryllium to contract as freely as possible.



USES CLADDING: Exploded view shows "picture frame" cladding assembly used in rolling hot-pressed beryllium slabs to sheet.

After cooling, the assembly must still be handled carefully to prevent undue stressing of the beryllium. The cladding is then removed in a hot, 50-pct nitric acid solution. The resulting sheet is now ready to be flattened and trimmed to size.

Roller leveling and stretcher straightening must be done hot; otherwise, there's a high risk of cracking the beryllium sheet due to improper procedure.

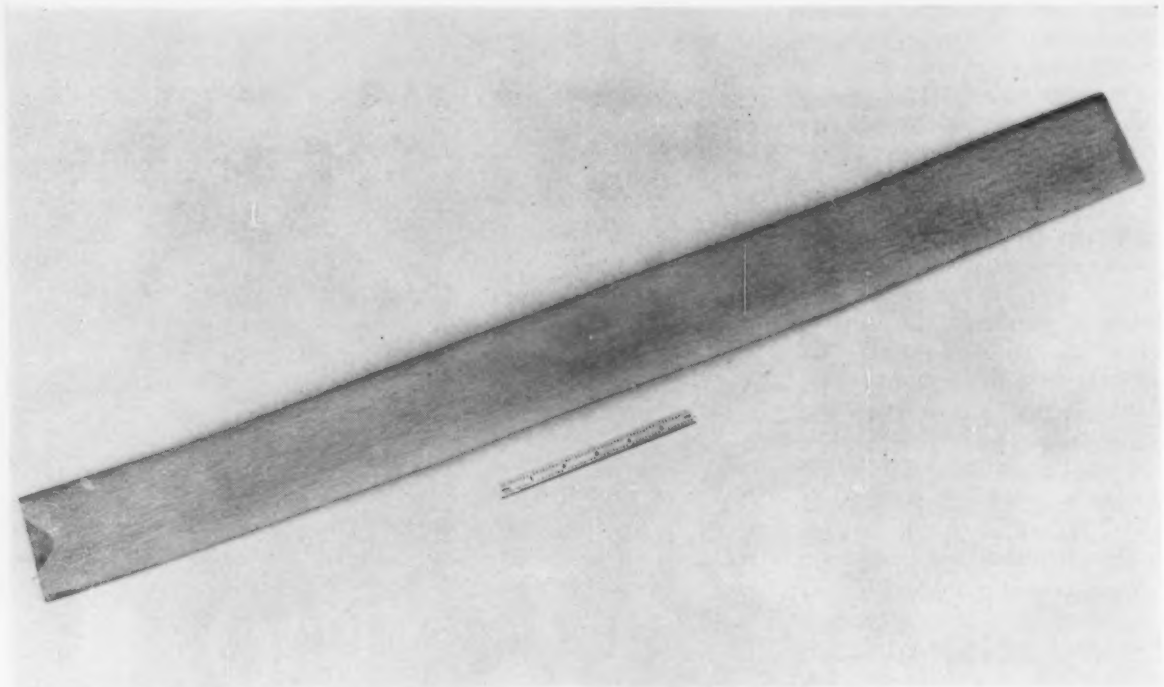
Meets Tolerances—Creep flattening is probably the best method to use. This procedure involves placing of the sheet between heavy plates. Raising the temperature high enough allows the beryllium to flatten by the mechanism of creep under the weight of the plate. Flatness, achieved by this method, usually meets commercial tolerances.

Gage control of beryllium sheet to date has been quite good. It's fairly easy to determine the gage of the beryllium during rolling even though it's clad with steel. Differences in thermal properties allow the outline of the sheet to show through the cladding as a dark area. Dimensions of this area are then measured. A rapid calculation gives the thickness of the sheet.

Normally, the properties of the original hot-pressed slab are: 30,000 psi yield, 40,000 psi tensile, and 1 pct elongation. However, sheet properties are strongly influenced by the rolling parameters.

Planes Line Up—During rolling, the basal planes of the close-packed hexagonal crystal structure align themselves parallel to the plane of the sheet. This preferred orientation, in effect, raises the mechanical properties.

Properties now are: 50,000 psi minimum yield, 70,000 minimum tensile, and 5 pct minimum elongation.



NEED CROSS-ROLLING: Bar stock was hot-rolled directly from cast beryllium ingot. Next, it will be cross-rolled to thin-gage strip. Cross-rolling produces similar properties throughout plane of sheet.

The preferred orientation needed to produce good mechanical properties in the plane of the sheet can be obtained with as little as a 2:1 overall reduction ratio. However, a 4:1 reduction ratio gives optimum properties.

Effects Grain Size—Suppose rolling temperature is increased. This has the effect of reducing preferred orientation. But it also has a much more serious effect on the grain size of the final sheet.

Consider this example. A sheet with a grain size of about 30 microns had properties similar to those described above. However, a heat treatment, producing recrystallization and grain growth to 90 microns, lowers properties to about 30,000 psi yield, 45,000 psi tensile, and 3 pct elongation.

Sheets 3 ft x 5 ft x 1/16 in. have been produced consistently. However, further development is needed to get a 4-ft wide product. It's much more difficult to produce a wide sheet because of handling and mill shape problems.

No Problem Here—The length of the sheet is relatively easy to achieve. There's no need to alter mill shape whether a 2-ft long sheet or an 8-ft long sheet is produced.

Other Raw Materials?—Production of beryllium sheet has just about reached the stage of being commercially available.

As mentioned earlier, the raw material used most often for production of beryllium sheet is a hot pressed slab of powder. This doesn't mean that other forms of beryllium are not being studied.

Under a Lockheed sponsored contract, Beryllium Corp. had produced 0.040-in. strip rolled from extruded cast ingots or rolled directly from a cast ingot. This experimental work has been quite successful to date.

The major problem is to achieve a grain size comparable to that of hot-pressed material. Grain sizes achieved to date have been relatively large. Result: properties are in the range of 40,000 psi yield, 50,000 psi tensile, and 3 pct elongation.

Need Sound Castings — Another area which needs development is the production of a sound casting. Although billets used in this program were electron-beam melted, completely sound ingots could only be attained on a selective basis.

Further development work in the area of fabrication of cast metal will be continued. The use of cast metal as a starting material would eliminate the step of converting the beryllium to powder and pressing. Therefore, a substantial reduction in cost in the price of beryllium products would result.

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Square-Butt Welding Costs Less

Welding 1¼-in. thick aluminum normally requires special V-joint preparation, preheating and several passes to fill beveled openings.

By using square-butt Mig welding, you can eliminate these steps to save time and materials.

■ Heavy-wall aluminum tubes, for use in the nuclear industry, are now being welded more economically, in fewer passes, with less total heat input and at greatly increased speeds. How? It's being done with a technique called "square-butt" welding.

This method, also known as high-current welding, enables the welding of heavy aluminum plate at currents well above 400 amp. Formerly, attempts to exceed 400 amp with Mig welding resulted in arc instability, severe oxide folds between weld layers and weld porosity.

Tried Example—National Steel and Shipbuilding Co., San Diego, has put the process to work in its plant using Mig welding equipment from Linde Co., Div. Union Carbide Corp., New York. Right from the start, square - butt welding proved it could reduce distortion and cut machining and scrap costs.

Previous metal-arc welding of the 1¼-in. thick aluminum cylinders called for open-vee beveled edges. The open-vee required much machining time. The joint was then pre-heated to 300°F. Other time-consuming steps were the welding of one side, then back-chipping and the welding of the opposite side. This method also requires several stringer-bead passes to complete the joint.

The square-butt welding process takes much less time. Only simple joint preparation is needed. This consists of a clean, square, end-to-end joint. Single-pass welds, one from each side, result in full buildup and penetration.

Increases Heat—Sigma welding's high-operating currents (up to 600 amp, dc, reverse polarity) increase heat input at the weld zone and eliminate porosity. The puddle remains molten long enough for porosity-forming gases to bubble out.

Total heat input is reduced, since only one stringer-bead pass is needed from each side of the joint. This factor holds distortion to a minimum. The high-quality welds are attained at a very low cost.

Apply the Proper Setting to Your Needs

Plate Thickness (In.)	Type of Joint	Edge Preparation	Wire Diameter (In.)	Shielding Gas Argon cfh	No. of Passes	Welding Speed (ipm)	Current (amp) DCRP	Voltage (v.)	Approximate Wire Feed Speed (ipm)
¼	*Square Butt	Heliarc Cut or sheared with edges filed	3/32	80	1	23	370	24	170
¼	*Square Butt	Same as above	1/16	60	2	35	280	23 – 24	240
⅜	*Square Butt	Same as above	3/32	80	1	18	420	24 – 25	200
⅜	*Square Butt	Same as above	3/32	80	2	28 – 30	350	24 – 25	155
½	*Square Butt	Same as above	3/32 or ⅛	100	1	14 – 15	450	25	3/32 wire – 210 ⅛ wire – 125
½	*Square Butt	Same as above	3/32	80	2	23	430	25	205
⅝	*Square Butt	Same as above	3/32	80	2	18	430	25	205
¾	*Square Butt	Same as above	3/32 or ⅛	100	2	16	450	25 – 26	3/32 wire – 210 ⅛ wire – 125
1	*Square Butt	Same as above	3/32 or ⅛	100	2	10 – 12	500	25 – 26	3/32 wire – 240 ⅛ wire – 135
1¼	*Square Butt	Same as above	⅛	100	2	8 – 10	550	26	145
1½	*Square Butt	Heliarc Cut or sheared with edges filed	9/64	100	2	8	590	26	130

*** NOTE: A variation of this high current density technique may be employed when weld reinforcement is reduced to a minimum through the use of a joint design consisting of grooved or beveled plate edges. Under such conditions, welding procedures will be the same, with perhaps somewhat higher travel speeds and lower currents than shown above.**

Plastic Sleeves Save Mandrels

Laminate Cover Also Curbs Tool Wear On Turning Jobs

Cutting tools can ruin a mandrel on a tube-turning job, especially if the operator isn't careful.

Here's a tip that can lengthen mandrel life. It's a plastic sleeve that absorbs the punishment.

▪ A mandrel cover made of laminated plastic prevents damage to the expensive steel mandrel.

Very often on a turning job, the steel mandrel receives a few serious nicks and bangs that shortens its life. This is especially true where cutoff jobs are performed on tube stock. The tool bites through the work and strikes the mandrel.

The laminate sleeve fits between the mandrel and the work to take the punishment that would normally be placed on the mandrel.

Cuts Tool Wear—The sleeve can be used repeatedly, even after it's scarred many times over. It prevents premature dulling or damage to steel or carbide-tipped cutoff tools. The dulling normally would result from tools striking the hardened mandrel.

Production also gets a boost because there is less time lost in replacing, regrinding and resetting tools. The sleeve prolongs mandrel life which normally has to be discarded or reground when it is scarred.

Do It Yourself—The laminated-plastic mandrel covers can be made quickly from any good mechanical grade tubing of proper size. Diameter and length are governed by the tubing sections being worked.

First slit the laminate tube longitudinally from one end to within one inch of the other. Make four cuts in this manner, 90° apart. Then make four similar cuts from the opposite end, also at 90° intervals from each other, but running midway between the first cuts.

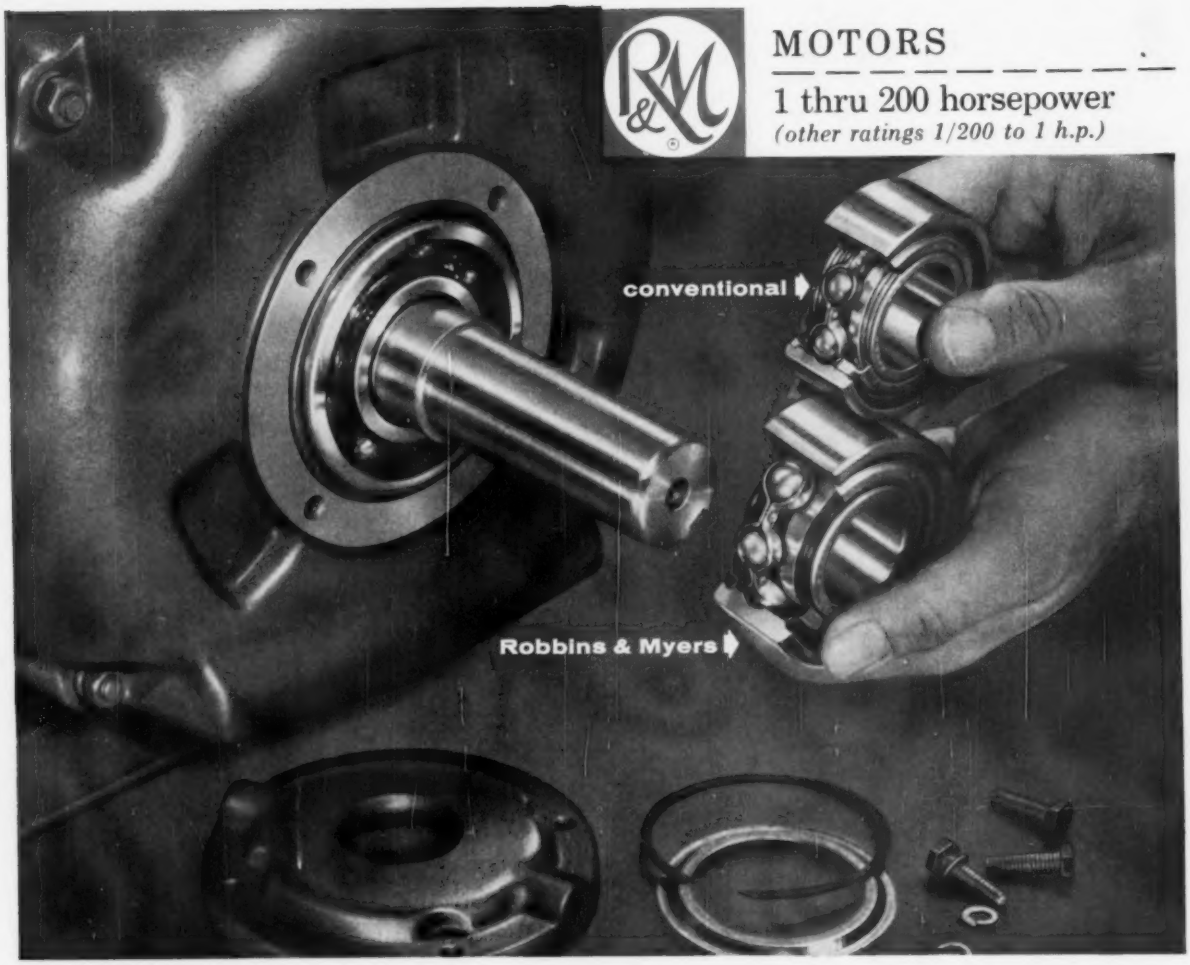
The piece can be made in about 20 minutes. To use the sleeve, slip it over a steel mandrel. The workpiece or tube is then placed in position over the sleeve. As the mandrel expands, the slotted laminate sleeve also expands. The expanding action holds the workpiece tightly in place.

Throw Away Type — Harry L. Hildebrand of Taylor Fibre Co., Norristown, Pa. describes the sleeve as a real money saver on turning and cutting operations. Naturally, it's cheaper to throw away a worn sleeve than to replace a costly steel mandrel.

Laminate expanding mandrels can be re-used many hundreds of times, even when scarred. The soft material cannot in turn scar the inside of the workpiece.

Where cutoff operations are performed on tube stock, a mandrel cover made of inexpensive laminated plastic is excellent insurance against damage to the expensive steel mandrel.

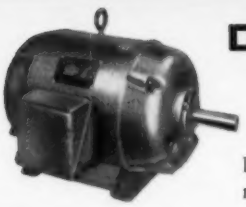
CUTS COSTS: The low-cost laminated sleeve protects and greatly lengthens the life of the steel mandrel. Regrinding costs are eliminated.



MOTORS

1 thru 200 horsepower

(other ratings 1/200 to 1 h.p.)



Double Width Bearings Hold More Grease...*Insure Longer Motor Life!*

Bearings in ROBBINS & MYERS motors run in double-width races with extra-large lubricant reservoirs. Bearings are fully sealed and pre-lubricated with laboratory tested grease which resists dust, temperature, humidity and high operating speeds. Tests prove these bearings can withstand six to nine years of severe service without relubrication. Bearings are further protected by metal seals on each side. Seals keep impurities out, prevent failure caused by "forgotten" lubrication or damaging over-lubrication.

R&M insures longer motor life with many additional features: Mylar* insulation that has 8 times the dielectric strength and 35 times more moisture resistance than ordinary paper insulation . . . removable caps for quick bearing inspection and relubrication . . . end heads that give full-height protection . . . dual-sweep ventilation for efficient cooling. For details, write today for Bulletin 520-IA.

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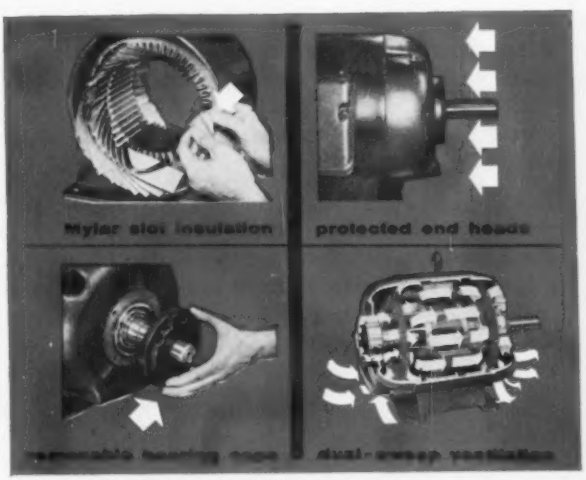

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PATENT REVIEW

New Patents In Metalworking

Coated Ferrous Metals

Process for coating ferrous metals, E. R. Boller (assigned to The Boller Development Corp., Marion, Ind.), Oct. 25, 1960. In the hot-dip coating of ferrous materials with aluminum or aluminum alloys, the cleaned ferrous material is galvanically coated with chromium in a fused metallic chloride bath. It is then immersed in the molten aluminum bath. The chromium coating prevents formation of intermetallic iron-aluminum compounds. No. 2,957,782.

Colored Stainless

Coloring stainless steel, R. C. Bongartz and J. M. Beigay (assigned to Allegheny Ludlum Steel Corp., Brackenridge, Pa), Oct. 25, 1960. To provide any of a variety of permanent colors on bright and lustrous stainless steel surfaces, the steel is immersed in an aqueous solution of potassium hydroxide. An electric current is then impressed through the solution, with the steel acting as the anode. Current density, temperature, potassium hydroxide concentration, and length of immersion period are variables controlling the color produced. No. 2,957,812.

Mold for Steel Ingots

Ingot mold, W. W. Schofield, W. H. Owen and J. Bidner, Oct. 25, 1960. In a mold for casting steel ingots with the large end up, the wall thickness of the mold is gradually decreased from the top of the mold downward. Freezing action of the ingot from the bottom upward is enhanced. No. 2,957,213.

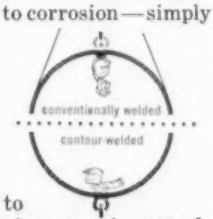
Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

"The Gravity Kid" shows how

CONTOUR-WELDED STAINLESS TUBING DEFIES CORROSIVE ATTACKS

It's smoother inside than any other tubing—welded or seamless—because the patented* Contour-welding process virtually eliminates the weld bead. And this smoother surface ensures greater resistance to corrosion—simply because there are fewer focal points for corrosive attack.

You see, in conventionally welded tubing, gravity pulls the molten metal down into the tubing. This forms a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal areas for corrosive attack.



Contour-welded tubing, however, is welded at the bottom. Gravity still pulls the molten metal down. But now the weld area corresponds to the contour of the tube. There's virtually no weld bulge on the inside surface. And even on the O.D., the weld seam closely conforms to the tubing contour.

Contour-welded tubing is smoother, too, than seamless. That's because it's formed from uniformly rolled strip steel, whereas seamless is extruded or pierced.

But get full details on this corrosion-resistant tubing. Send for our free 48-page manual on Contour-welded tubing in sizes from 1/8" to 40" O.D.—in stainless and high alloy steels, titanium, zirconium, zircalloy and Hastelloy.*

U.S. Patent 2,716,692

*Trademark Haynes Stellite Co.

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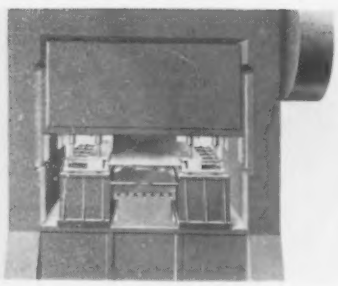
New Materials and Components

Air Clutch and Brake Features Easy Adjustment

With a maximum effective air pressure area and more compactness, an air clutch and brake has a large torque capacity. Placing of the heat-generating pressure plates to the outside, promotes better heat dissipation. It also allows cooler running and longer life. A self-centering ring eliminates internal clutch drag. A high-temperature diaphragm makes the clutch suitable to uses impractical for other clutches. (Mid-States Industrial Clutch Co.)

For more data circle No. 25 on postcard, p. 159



Draw Press Attachment Produces Stronger Part

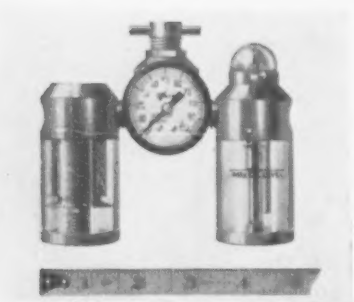
For standard draw presses, a stretch forming attachment stretches metal independently and prior to the die forming operation. Movement of the press brings the prior stretched sheet down over the die. Almost at the same time, the upper die comes down upon the lower die finishing the work. The action of the hydraulic stretch heads removes any tendency of trapped metal and wrinkles. At the end of the work cycle, the stretch tension is relieved. The upper die is then withdrawn. (The Cyril Bath Co.)

For more data circle No. 26 on postcard, p. 159

Back Face Plate Makes Old Chucks Like New

An adjustable back face plate allows a new chuck or an old chuck to be made better than new. This is the main purpose for using the plate. By using this face plate, a chuck within 0.0001 in. can be indicated. For a grinder, it enables the indication of the grinder within the closest possible tolerance. The face plate is very simple. It attaches to most any type of grinding fixture. It is a proven fact that after using the face plate, speed and production are increased very much. The adjustable face plate comes in four standard sizes. They are: 5, 6, 8 and 10 in. (Wesco Tool, Inc.)

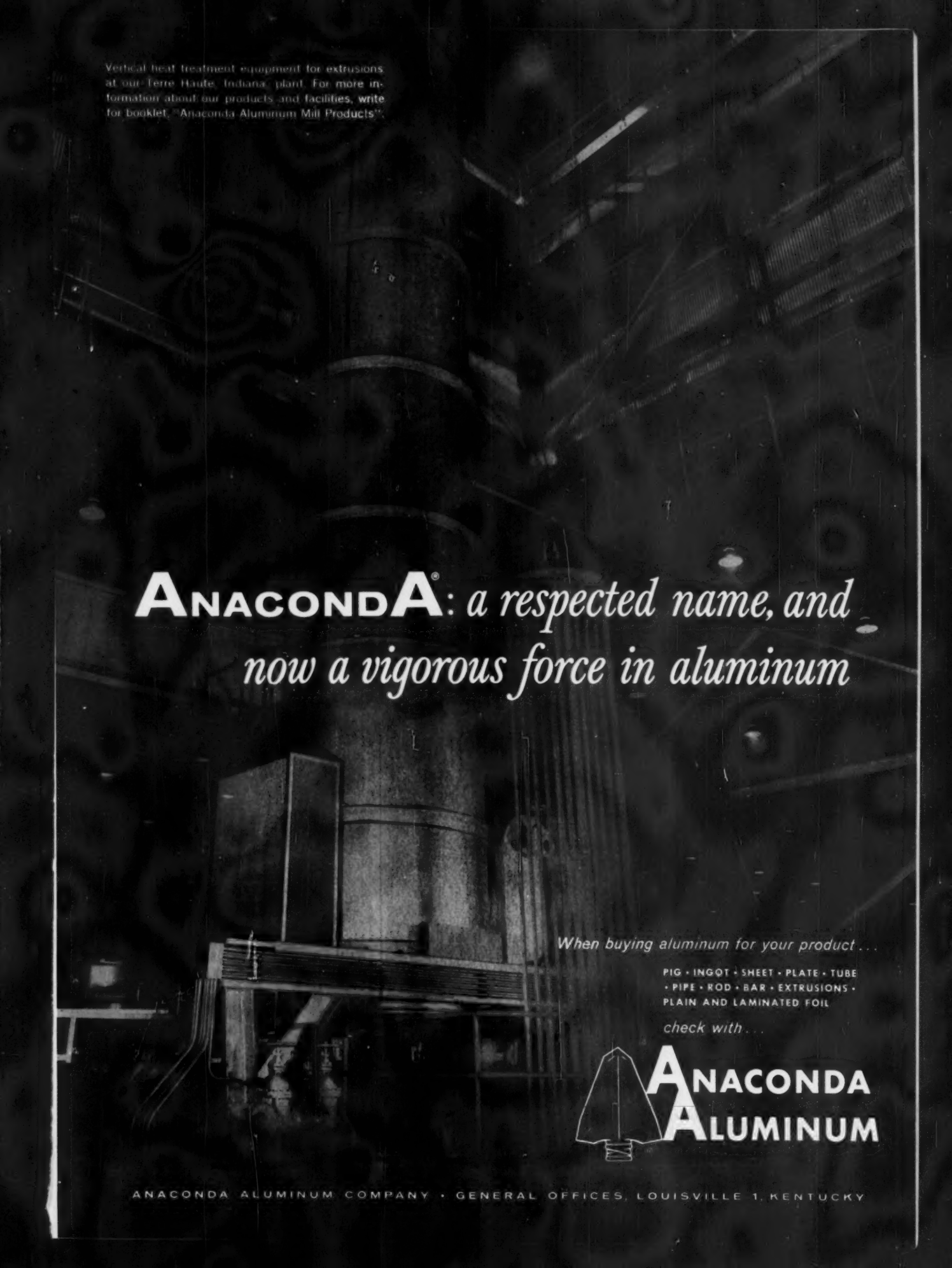
For more data circle No. 27 on postcard, p. 159



Filter-Regulator-Lubricator Fits in Small Space

For applications where space is limited, a compact air line filter-regulator-lubricator has a maximum pressure of 150 psi. Also for application where low flow requirements are a factor, the unit features a 20 micron porous bronze element. The lubricator incorporates the manufacturer's by-pass principle. It provides good lubrication at flow rates from 0.2-15 cu ft per minute, without excessive pressure drop. Both fill plug and oil feed adjustments are interchangeable front to rear. The miniature filter-regulator-lubricator comes in ⅛- and ¼-in. sizes. (Watts Regulator Co.)

For more data circle No. 28 on postcard, p. 159



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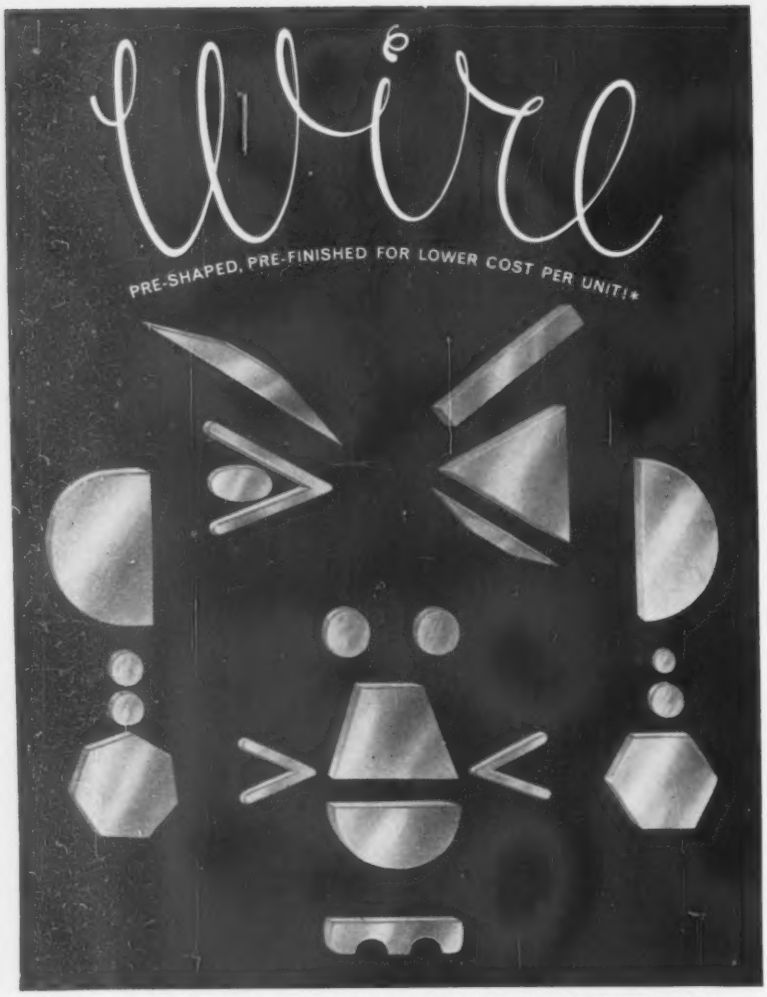

*Examples shown are greatly enlarged cross-sectional views of selected standard and special shapes available

The right shape plus the right finish equals lower production costs

with CONTINENTAL® round and special shaped wire

Face up to the pleasant fact that you can often shave your production costs appreciably—and win extra sales—by choosing the right shape in wire. You save because you eliminate forging, stamping, rolling or machining operations. What's more, you can get these ready-made shapes (and many others than shown) in bright, galvanized, coppered, liquored, or tinned finishes that save further in polishing and plating. If you use low and medium low carbon steel wire in any shape, form or finish, by all means learn what Continental can offer you. We have solved literally thousands of problems involving wire. We'd love to have a shot at solving yours.

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CONTINENTAL STEEL CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

DESIGN DIGEST

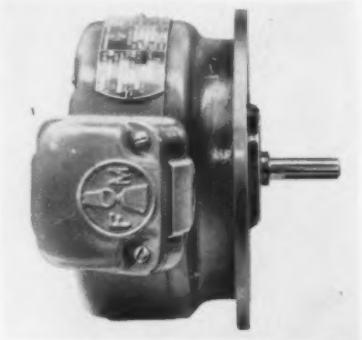
Revolving Stops

For automatic and hand screw machines, a line of revolving stops revolves freely under load, working against a single ball. This nullifies the detrimental brinnelling effect of multiple ball races. End play of the revolving head can be eliminated by an unusual self-locking screw adjustment. The free-turning head prevents marring end of workpieces. The stops are made of alloy steel and are heat treated for maximum durability. (Mueller Industries)

For more data circle No. 29 on postcard, p. 159

Small Motors

In flange-mounted construction, a radial air-gap motor line features minimum overall length and reduced weight. It has low rotor inertia. The line is designed for uses where fast acceleration, frequent start or reversing duty is required. The line includes ratings from ½-25 hp in speeds 900-3600 rpm, in three basic



frame sizes. Four different flange diameters come in 1, 1½ and 2 hp ratings. A rugged industrial-type cast iron housing provides maximum protection to windings; also, resistance to corrosion under adverse operating conditions. (Fairbanks, Morse & Co.)

For more data circle No. 30 on postcard, p. 159

Compact Nozzle

For use where space is limited, a nozzle is made to solder into standard ½-in. copper tubing fittings. It projects less than ¼ in. from the fitting. The nozzle is

adaptable to plastic molds, cooling and washing. It is made entirely of brass. Its flow rate is 1 gpm at 40 psi. It has a spray pattern of about 110° spray angle. (Bete Fog Nozzle, Inc.)

For more data circle No. 31 on postcard, p. 159

Valve Actuator

Solving space and cost problems, a hydraulic valve actuator fits well within overall dimensions of valve body. It has rectangular reservoir, pressure switch, internal and external relief valves, hand pump and

special safety signals and devices. The 1½-in. bore cylinder develops 5000 lb. thrust. Internal relief valves serve all customary valve functions; external relief valve serves as thermal expansion valve. (Oil-Dyne Inc.)

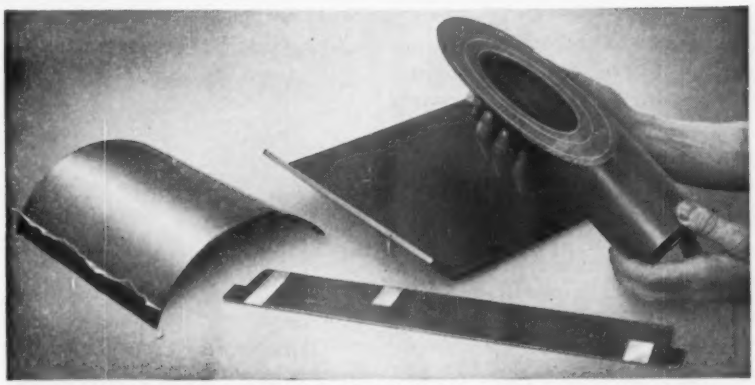
For more data circle No. 32 on postcard, p. 159

Insulating Brick

Ceramic insulating brick withstands temperatures to 4200°F. It comes in standard brick sizes of 2½ x 4½ x 9 in. The brick has a mean thermal conductivity at 2200°F of less than 1.0. It has an 89-pct porosity and weighs about

2 lb per brick. Basically, the brick is an exclusive formulation of zirconium oxide material that is expanded and fired. A cellular structure consists of uniform open pores. All cells are interconnected

Important facts to know about laminated plastics



A few Taylor composite laminates (left to right): copper-clad section; sandwiched copper component; Taylorite vulcanized fibre-clad part; laminated tube, copper inserts.

Composite Laminates Open Up New Design Opportunities

While the great variety of commercially available laminated plastics satisfy most electrical and mechanical requirements, there are applications that can benefit from the combination of properties provided by composite laminates. Recent advances in bonding techniques have made it possible to bond virtually any compatible material with a laminate. These can be supplied as clad or as sandwiched materials. And they can be molded into many shapes to fit design requirements. Taylor is presently supplying to order the following composite laminates:

- **Copper and laminated plastics.** Clad for printed circuits and formed shapes. Sandwiched for special applications.
- **Taylorite® vulcanized fibre-clad laminates.** These combine the high strength of laminated plastics with the superior hot-arc-resistance of vulcanized fibre. They are being used in both high and low-voltage switchgear applications. Also in applications where the high impact strength of vulcanized fibre may be advantageous.
- **Rubber-clad laminates.** Almost any type of natural or synthetic rubber may be used as the cladding material. These laminates are widely used for condenser tops in wet condensers to protect the laminate against highly alkaline electrolytes. They also have application in any part where sealing or chemical resistance is needed.
- **Asbestos-clad laminates.** For applications where high heat- and arc-resistance are required.
- **Laminate-clad lead.** Lead sheets sandwiched between Grade XX paper-base laminates have been used for X-ray shields. The laminate provides strength and contributes to the high shielding properties of the lead.
- **Aluminum-clad laminates.** These have been used extensively for engraving stock. They also offer possibilities as printed-circuit material and as plate holders for X-ray machines.
- **Beryllium copper-clad laminates.** Beryllium copper is nonmagnetic and a good conductor—properties that give these laminates possibilities in many applications.
- **Stainless steel-clad laminates.** Applications where nonmagnetic properties are required. Also in certain corrosive environments where the resistance of stainless steel to attack is an asset.
- **Magnesium-clad laminates.** These laminates have been produced in 108-in.-long sheets for use as screens for X-ray operators. Weight was a factor.

Our design and production engineers are constantly developing new materials, new applications, and new procedures for fabricating laminated plastics. Our experience is yours for the asking. And if you have a problem requiring assistance or more information on composite laminates, write us. Also ask for your copy of Taylor's new guide to simplified selection of laminated plastics. Taylor Fibre Co., Norristown 52, Pa.

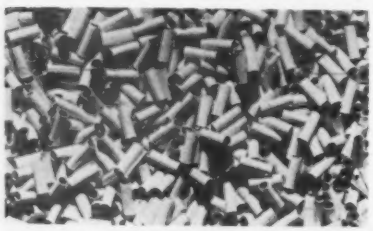
Taylor
LAMINATED PLASTICS VULCANIZED FIBRE

and permit gas to pass through for purging or evacuation. Its melting point is 4620°F. (Ipsen Industries, Inc.)

For more data circle No. 33 on postcard, p. 159

Packing Material

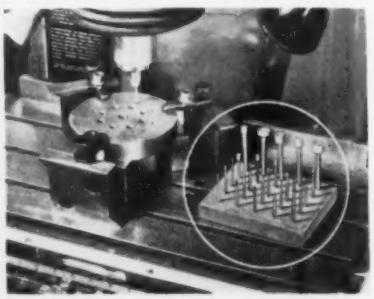
Protecting fragile items, a packing material consists of resilient, hollow cylindrical paper tubes. They are ¾-in. long by ¼-in. diam. Fast and easy-to-use, the material is poured to surround and securely



suspend an object in a container. It reduces packing time up to 70 pct. The material is clean and odorless. It leaves no chips, scraps, dust or dirt. It is also reusable. The protective cushioning qualities of the material are not affected by temperature or climatic conditions. Resinous coating eliminates migration of packed items during shipping and handling. (Safe-T Flo-Pak)

For more data circle No. 34 on postcard, p. 159

Diamond Grinding Pins



Jig grinding, internal grinding of small holes and other precision grinding operations are simplified by a line of diamond grinding pins. Smaller sizes of the pins come in 0.010 in. intervals. This close tolerance enables a maximum size shaft to be used. This insures greatest accuracy by minimizing the possibility of whip and shaft run-out. All 25 sizes come in two grit sizes. They are: 80/100 grit and 200/240 grit. The diamond grains are permanently bonded to hardened tool steel shafts. (Titan Tool Supply Co., Inc.)

For more data circle No. 35 on postcard, p. 159

Differential Isolator

By breaking ground loops in data acquisition systems, a differential isolator solves a noise problem for system engineers. This applies to

existing or future data acquisition systems. It converts a floating three-terminal wideband dc instrument amplifier into a four-terminal wide-

The revolutionary Bliss Pulsation Burner

produces temperatures never before achieved with oil or natural gas. Burning oil, it can reach a searing 3450°F. On 1000 BTU/cu. ft. natural gas, it develops 3320°F. Both these extremely high temperatures are close to the theoretical limits for these two fuels. Foundries, smelters, heat treaters and other metal processers have been quick to take advantage of the remarkable combustion efficiency of these new burners. To them, it has meant faster heating cycles, cleaner flue gases, and above all, fuel economy that cuts from 12% to 30% from their furnace overhead. Not to speak of reduced maintenance on refractory linings.

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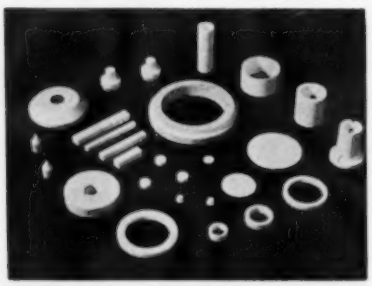
BLISS is more than a name—it's a guarantee

band dc amplifier. Used alone, it functions as a dc to 20 kc isolation transformer. Input circuitry is isolated from output circuitry. Chassis and all circuitry are isolated from ground. (Computer Engineering Assoc., Inc.)

For more data circle No. 36 on postcard, p. 159

Ceramics Resist Heat

A line of ceramics resists heat to 3000°F. Their hardness is in the range of carbides; dielectric strength is as high as 250 v per mil. These high aluminum oxide ceramics offer compressive strengths to 400,000 psi. Standard size tolerances are as close as ±0.005 in. as fired. They can be ground to ±0.0001 in. The



ceramic series parts come in diameters to 10.00 in. Parts can be metallized for soft or hard soldering. (Duramic Products, Inc.)

For more data circle No. 37 on postcard, p. 159

Universal Joints

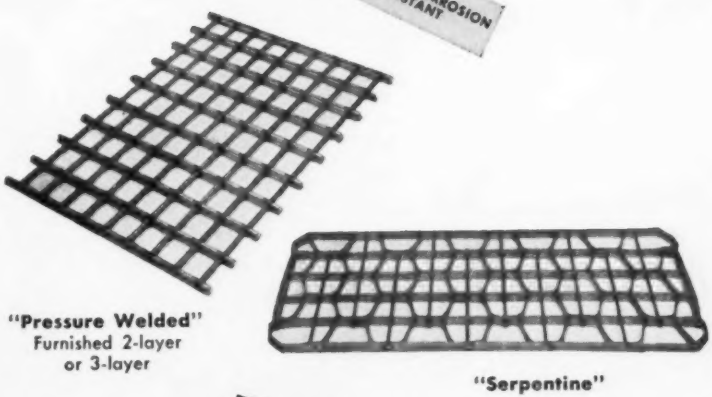
For industrial uses up to 1500 rpm, a line of universal joints comes in both single and double joints, in a wide range of sizes. Single joints provide smooth, sensitive operation through a full working angle of 40°; double joints through 80°. Rated at 0.35-190 hp at 100 rpm, they come in sizes from ⅜ to 4 in. Case hardened and fine alloy steels are used to achieve light weight and good durability. (Lovejoy Flexible Coupling Co.)

For more data circle No. 38 on postcard, p. 159

Air Regulators

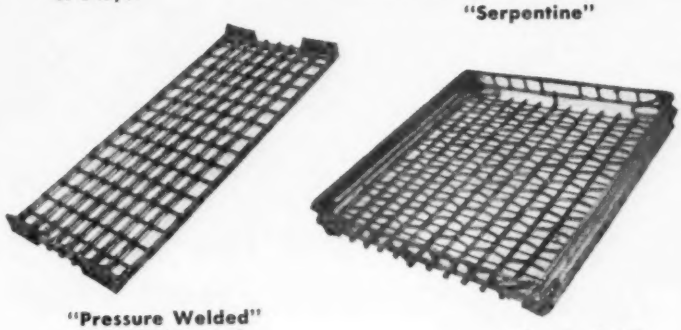
Quick-adjusting, compressed air regulators have a lever and coarse adjusting screw in place of the standard fine thread and tee-handle type adjustment screw. A 180° turn of the lever adjusts the regulators from 0-60 psi. A 360° turn

ROLOCK®
HEAT AND CORROSION RESISTANT



"Pressure Welded" Furnished 2-layer or 3-layer

"Serpentine"



"Pressure Welded" with pusher pads

"Serpentine" with load-retaining sides

ROLOCK "ORIGINALS" help heat treaters reduce costs

Rolock has done more, we believe, than anyone else in the field to *originate* improved design and construction features that have consistent practical value to the heat treater.

Well-known examples are the Rolock patented design automatic pusher furnace trays; Rolock Serpentine construction, applicable to a wide range of flat- and basket-type tray designs; Rolock double- and triple-layer pressure welding applied to grids and trays; Rolock *Corrugated* construction of baskets and muffles. There are also many other detail advances that were pioneered by our engineering department.

These improvements have resulted in longer furnace-life expectancy . . . often with a far more efficient load-to-weight ratio . . . superior heat transfer and overall performance . . . all key factors in making money while maintaining the quality of your work.

Are you enjoying these very real competitive advantages? We'll welcome an opportunity to quote on your current needs.

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JOB-ENGINEERED for better work
Easier Operation, Lower Cost

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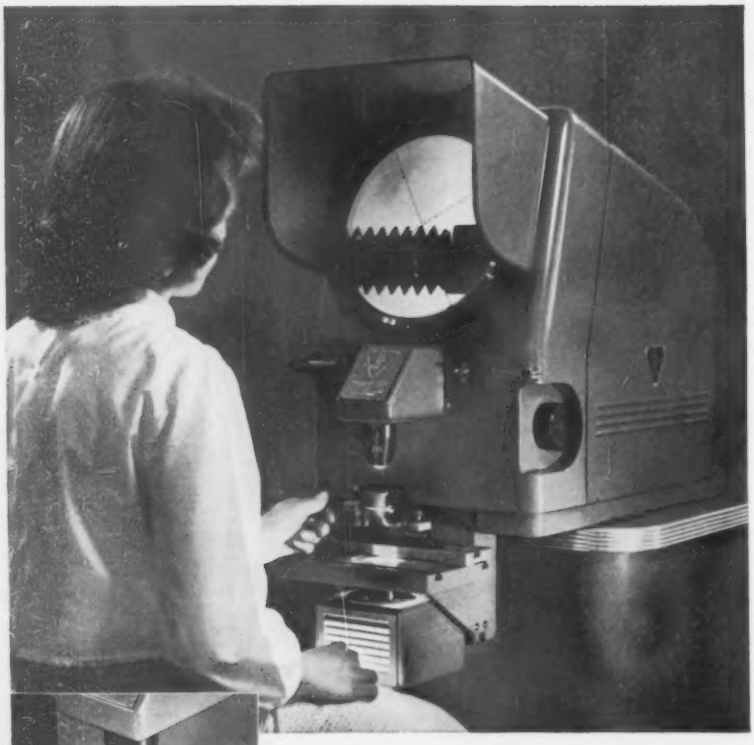

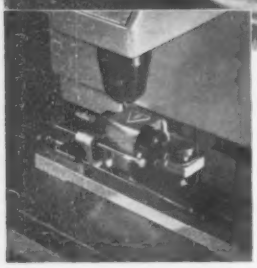

Measure SPECIALS Easily with This New Universal Staging Fixture

Cut set-up problems in measuring small parts, cylindrical pieces, odd shapes. There's a new Universal Staging Fixture to position just about *any* part up to 3 inches in length. Mount the part and see the sharp image on the distortion-free 10-inch screen. Get micrometer readings to .001". So easy unskilled help can learn it in less than half a day. Other big savings, too . . . extremely low purchase price, *plus* almost unlimited versatility. With your choice of understage and surface illumination, and the new Universal Staging Fixtures, you can just about write off special jigs and fixtures as a cost factor.

Find out more about how B&L can simplify your precision inspection. There's a complete line of instruments to help you. Mail the coupon now.

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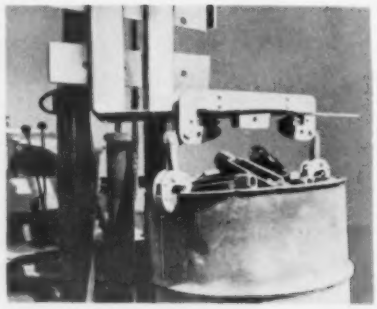
DESIGN DIGEST

adjusts them from 0-125 psi. Maximum primary (inlet) pressure is 300 psi. Maximum secondary (outlet) pressure of standard units is 125 psi. The regulators have two gage ports or 3 outlets. They are self-relieving or non-relieving. The units have balanced valve construction and a nylon reinforced diaphragm. (Wilkerson Corp.)

For more data circle No. 39 on postcard, p. 159

Fork Lift Drum Lifter

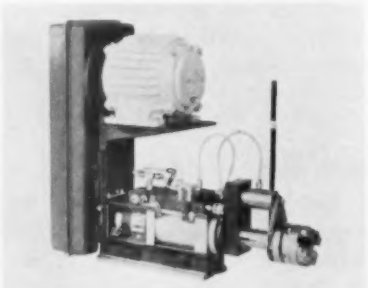


Non-tipping, a drum-lifting attachment combines the features of two individual units into one. For use with fork-lift trucks, it will lift and carry any drum with its two drum clamps; plus any other object from its centered shackle. It automatically locks itself when slipped onto the forks. However, it easily disengages when the load is released. The unit transforms any lift truck into a mobile overhead lifting unit. (Merrill Bros.)

For more data circle No. 40 on postcard, p. 159

Power Feed Units

Self-contained, quill-type power-feed units operate standard rotating-style, releasing-type, threading and



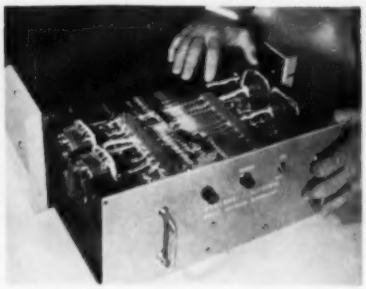
thread rolling heads. The units have air-powered yoke actuators for opening and closing the threading

heads at stroke end and full retract positions, respectively. Compressed air actuates the units. Compressed air is also used for thrust. The units incorporate adjustable cam controls for establishing any length of rapid travel within the stroke limits. During feed, the thrust of the quill is automatically balanced to allow the threading head to establish its own lead. (Hause Machines, Inc.)

For more data circle No. 41 on postcard, p. 159

Telemetering System

Transmission of integrated data, over existing analog telemeter channels, is possible with a digital telemetering system. The system accumulates and registers digital data inexpensively. It also does this with usual high accuracy inherent to digital techniques. It shares an

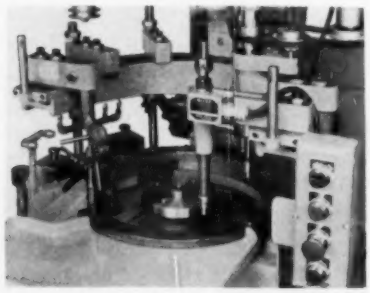


existing frequency-type channel. This eliminates the need for additional channel facilities. (General Electric Co.)

For more data circle No. 42 on postcard, p. 159

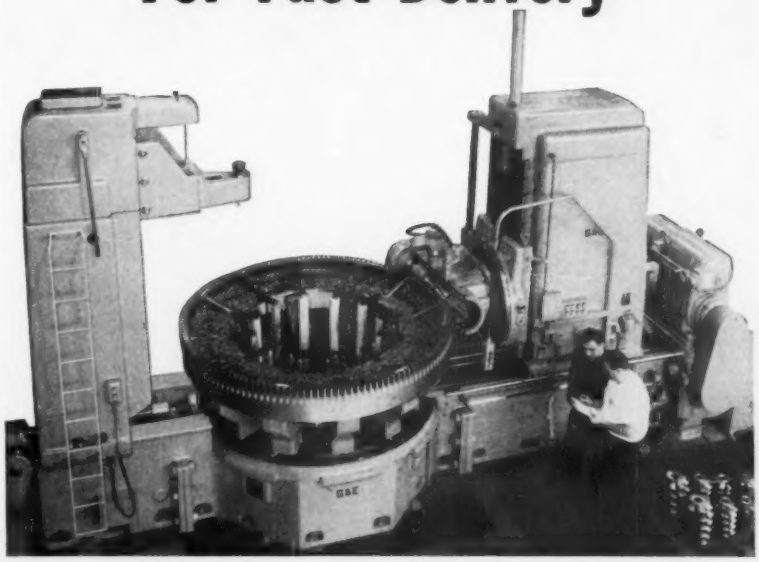
Inverted Spindles

Adjustable inverted countersinking spindles increase the flexibility of the company's dial-type machines. The new spindles are designed for countersinking and chamfering operations. They adjust in



the same way as a cutting tool in a lathe tool post. The spindle itself is a cartridge powered by a flexible

New Production Capacity For Fast Delivery



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Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

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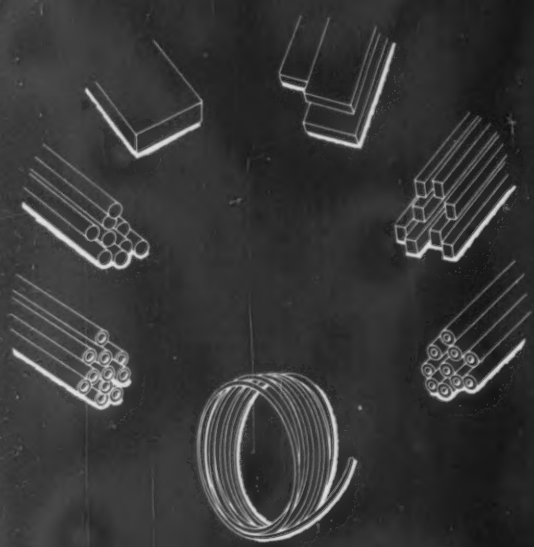


leadership through research

UNION STEEL CORPORATION

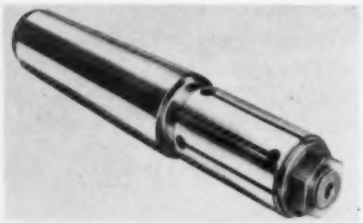
ALL FORMS FOR EXTREME CORROSION SERVICE

shaft drive. A micrometer adjusting screw sets depth of cut. The spindle can reach any position of the indexing dial. (The Bodine Corp.)

For more data circle No. 43 on postcard, p. 159

Expanding Mandrel

For internal chucking, an expanding mandrel can be used on inside diameters from ⅜-4½ in. with

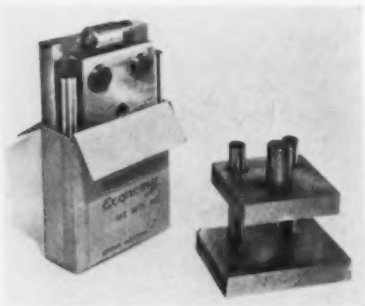


a maximum runout of 0.0004 in. Change of workpieces is quick since nut and collet form a unit. (Homestrand Machine Tool Corp.)

For more data circle No. 44 on postcard, p. 159

Die Sets

Compact, all-steel die sets feature a choice of three common lengths of ground and hardened pins (5, 6 and 7 in.) and two shank sizes. There are nine basic sizes in the line. Overall die area dimensions range



from 6 x 4 to 15 x 12 in. The dies come in "knocked down" form. This enables the user to spot die sections and to drill or machine the die holder as required, before the pins are installed. (Wheatley Economy Die Sets, Inc.)

For more data circle No. 45 on postcard, p. 159

Filter Cartridges

Plating solutions, diesel fuels, chemical process streams and many other fluids can be micronically

filtered with a disposable filter cartridge. The manufacturing process employs a separate filtering medium that is interwoven between the structural spiral winding. The filter traps progressively finer contaminant particles from outside diameter to core. The filter cartridge ends are wound square with the core axis. This enables any number of cartridges to be assembled end-to-end in tiered arrangements, without sealing devices. (The Cuno Engineering Corp.)

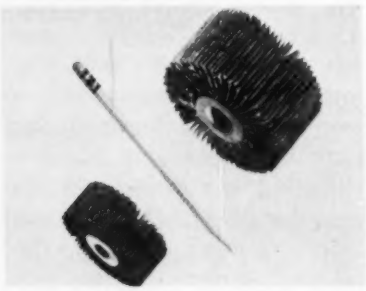
For more data circle No. 46 on postcard, p. 159

Limit Switches

Designed for ease of installation in metal-conduit wiring systems, a series of limit switches provides for right- or left-hand mounting. It also offers easy removal of basic switch for connection outside the metal case. An O-ring sealed side plate and neoprene boot-sealed operating plunger protect against dust, oil, condensation or moisture. (The W. L. Maxson Corp.)

For more data circle No. 47 on postcard, p. 159

Grinding Wheel



A small flexible grinding wheel comes in 2½- or 3-in. diam. It finds use on fixed or portable shafts, at speeds up to 15,000 rpm. The wheel's construction consists of scores of thin, flexible abrasive strips. Designing of the wheel is such that fresh abrasive is constantly exposed as the wheel is used. The wheel is adaptable to chucks or threaded spindles. (Merit Products, Inc.)

For more data circle No. 48 on postcard, p. 159

Distinguishes Alloys

An instrument differentiates between various aluminum alloys, magnesium alloys and copper alloys. It does this by indicating the difference in conductivity of a layer near the surface. The sensing head is relatively insensitive to distance. It gives a virtually constant reading even if the head is not kept square on the surface; even if the surface is anodized. The device can also be used to identify specific materials when they have lost their identity marks. (Schuco Scientific)

For more data circle No. 49 on postcard, p. 159

When close fits have to be "run-in"...

consider Lubri-Case

(-the sulphur case lubrication process that eases run-in of ferrous precision assemblies)

Close tolerance assemblies with ferrous mechanical parts produce the problem of break-in without breakdown of lubricity between design elements. Lubri-Case treatment of mechanical parts provides for quicker run-in with little or no scuffing, scratching or seizing.

For such parts Lubri-Case, a sulphur case treatment, produces a case high in sulphur on most ferrous materials imparting load bearing, long wearing, lubricating properties even in castable and machineable low cost iron and steel. Lubri-Case has been use tested in many applications under high speeds, heavy loads, elevated temperatures and close tolerances.

Drever Company, heat treating specialists since 1939, can Lubri-Case process your "specials" or your production quantities. Write or phone for further details.

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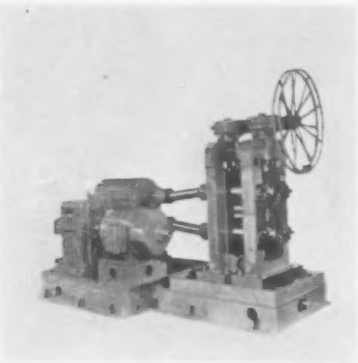
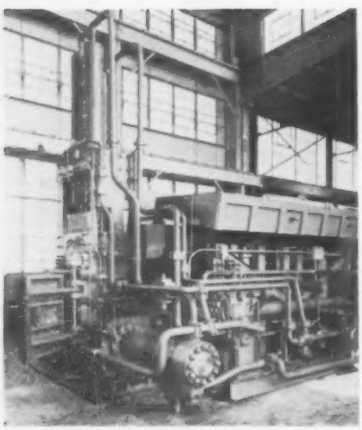
New Equipment and Machinery



Rolling Mill Features Infinite Speed Variation

Four-high, a precision rolling mill has an indefinitely-variable rolling speed from 100-1200 fpm. Suited for narrow-strip rolling, the mill also features anti-friction roller bearings and enclosed screwdown gearing. These permit accurate adjustment of the rolls. The totally-enclosed construction protects against wear from dirt and grit. A one-shot central lubrication system insures long maintenance-free operation. Hardened steel roll guides are mounted adjustable at entry side of housings. The work rolls are hollow bored for internal cooling. Rolls are driven from a special two-high reduction unit through universal joints. The motor is flexible-coupling connected to shaft on reducer unit. (Steel Equipment Co.)

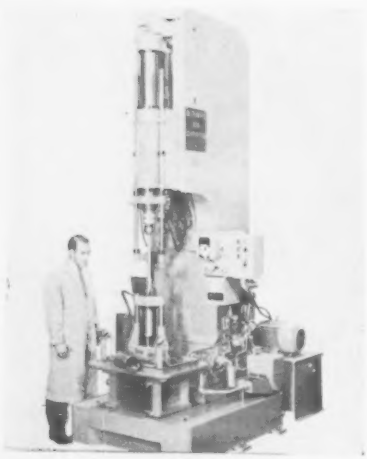
For more data circle No. 55 on postcard, p. 159



Combination Unit Shears and Bales Scrap

A combination unit cuts off heavy scrap. This includes round shafts, bars, flat pieces, auto and truck bodies with frames and stamping skeletons. It shears the scrap into any desired lengths from 0-60 in. Further, it can also bale the cut body sections and sheet steel scrap into high density blocks only 18 x 12 in. The third dimension varies by the amount and character of the scrap. A heavy magnet or grapple drops the heavy scrap to be sheared into the loading hopper. The hopper dumps the scrap into the shear box. The tamper cover comes down and exerts 35 tons pressure. This crushes the contents down to 3 ft. The side then moves in and squeezes the width to 3 ft. A gathering ram then feeds the scrap to the shear. Cut off in the desired length, the scrap tumbles out from the front of the press box. (Logemann Bros. Co.)

For more data circle No. 56 on postcard, p. 159



Vertical Hydrohoner Offers Heavy Stock Removal

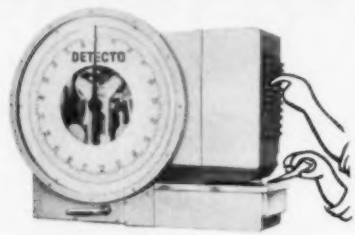
The unit-constructed spindle-in-quill feature of a vertical hydrohoner provides maximum input of power and minimum spindle eccentricity. This permits heavier, more effective stock removal. Supporting ball bearings are arranged to concentrate lines of thrust resistance at spindle centerline. The machine may be equipped with any type of riser block, or with a lateral- or rotary-indexing table with controls interlocked with machine control. This allows fully-automatic index cycle. The deep-throated column offers 25-in. clearance between column face and centerline of spindle. Automatic size control consistently obtains the required tolerance. It automatically terminates the microhoning cycle when the desired bore size is generated. Built-in reciprocation cylinder features rapid bore approach, reducing time of cycle. Various feed control permits controllable rate of stock removal. (Micromatic Hone Corp.)

For more data circle No. 57 on postcard, p. 159

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.



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Dicing Machine

For germanium and silicon wafers, a special dicing machine gives vibration-free operation. Built for maximum stability, the machine uses the most advanced methods to control table movement. The dicer offers good dicing parallelism. Hand operated, cross feed controls are accessible. They provide accurate, visual measurement scales that can be seen with minimum effort. Both silicon carbide and diamond cutting tools perform efficiently. (Reid Bros., Inc.)

For more data circle No. 58 on postcard, p. 159

Drill Grinder

Set-up changes in seconds is a feature of a multi-point drill grinder. This unit incorporates the principle of conical grinding. It grinds both general-purpose and special-purpose points common with today's numerous super-alloy metals. The drill

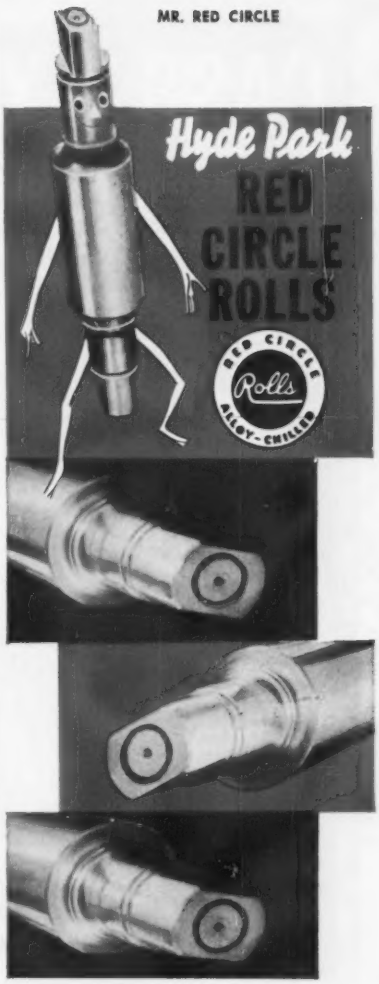
holder swivels in seconds to any point angle between 60° and 180°. There is a quickly adjustable stop for limiting the holder swing for three and four lip drills. (Hammond Machinery Builders, Inc.)

For more data circle No. 59 on postcard, p. 159

Refractory Gun

A refractory gun places refractory materials onto open hearth skewbacks, backwalls, front walls, port skews and uptakes. This gun makes possible easier, faster, less expensive repairs to hot open hearth and electric furnaces. The gun enables operators to place thick furnace patches at any time during

MR. RED CIRCLE



A Roll for Every Purpose

Our engineers will be glad to work with you in the production of any special rolls or rolling mill equipment.

IRON BASE TYPE ROLLS
Nickel Alloy Grain Rolls
Nickel Chilled Rolls
Grain Rolls
Chilled Rolls
Moly Rolls
Nodular Iron Rolls

Hyde Park
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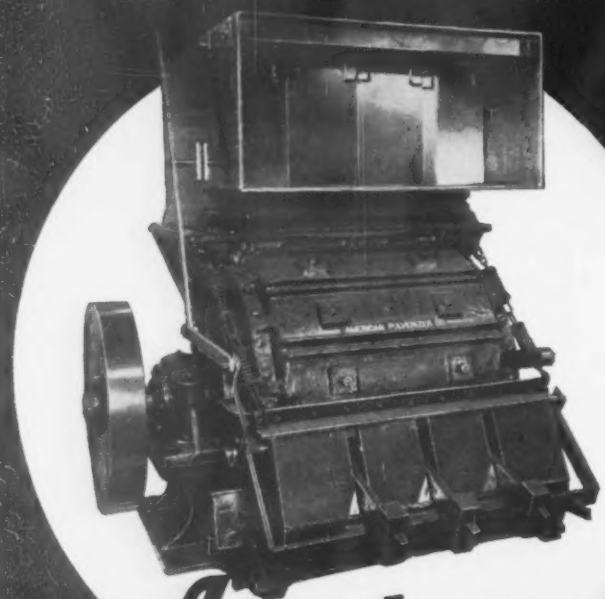
HYDE PARK
Westmoreland County, Penna.

Rolls
Rolling Mill Equipment
Gray Iron Castings

CASH IN YOUR CHIPS

Change Metal Turnings Waste into More Profitable Shoveling CHIPS



American METAL TURNINGS CRUSHERS

No progressive, profit-conscious company—who produces 10 or more tons of metal turnings per month—can afford to ignore the profit potential of a modern chip salvage system . . . with an American Metal Turnings Crusher at the core.

American installation profits include: $4 more per ton for chips than for machine turnings; up to 50 gallons per ton in cutting oil recovery; 75% less storage; easier, faster handling.

How many profit dollars are you losing under present operations? If, for example, you're currently producing 20 tons of turnings a month . . .

THIS COULD BE YOUR PROFIT STORY FOR NEXT YEAR!

240 Tons Metal Turnings per Year (20 tons/month at $4 extra per ton)	$ 960.00
6,000 Gallons Recovered Cutting Oil at 30¢/Gal. (50 gals. per ton x 240 tons = 12,000 gals. Half of this, 6,000 gals., can be credited to use of chips instead of turnings in reclamation)	$1,800.00
Estimated Savings in Manpower, Storage, Tools, Maintenance, Freight, etc.	$ 300.00
TOTAL GROSS PROFIT	$3,060.00

American PULVERIZER COMPANY

WRITE for Metal Turnings Crusher Bulletin.

Originators and Manufacturers of Ring Crushers and Pulverizers

1439 MACKLIND AVE. • ST. LOUIS 10, MO.

NEW EQUIPMENT

the heat cycle, without shutting off fuel and incurring lost production time. The unit mixes and agitates refractory material in a hopper pressurized to 70 lb per sq in. (Basic Inc.)

For more data circle No. 60 on postcard, p. 159

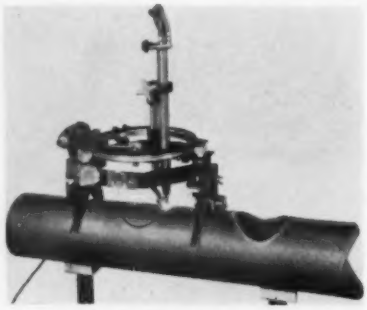
High-Heat Paint

High-heat aluminum paint withstands temperatures up to 1200°F. For either interior or exterior use, it can be applied by either brush, spray or dipping. It air dries or bake dries. The paint provides a thick, flexible coating resistant to industrial fumes, most acids, salt spray and weathering. (Speco, Inc.)

For more data circle No. 61 on postcard, p. 159

Cuts Holes in Pipes

Without cams, patterns or layouts, a hole cutter cuts 90° holes in pipe, tanks and flat plate. Three sizes of the unit permit cutting holes up to 18-in. diam. It is a lightweight machine. It can be used



with electric drive or may be completely hand operated in the field. Cutting is done with an oxygen, acetylene torch arrangement. Edges are clean, burr-free and have good weldability. (Steffan Mfg. Corp.)

For more data circle No. 62 on postcard, p. 159

Industrial Repair Kit

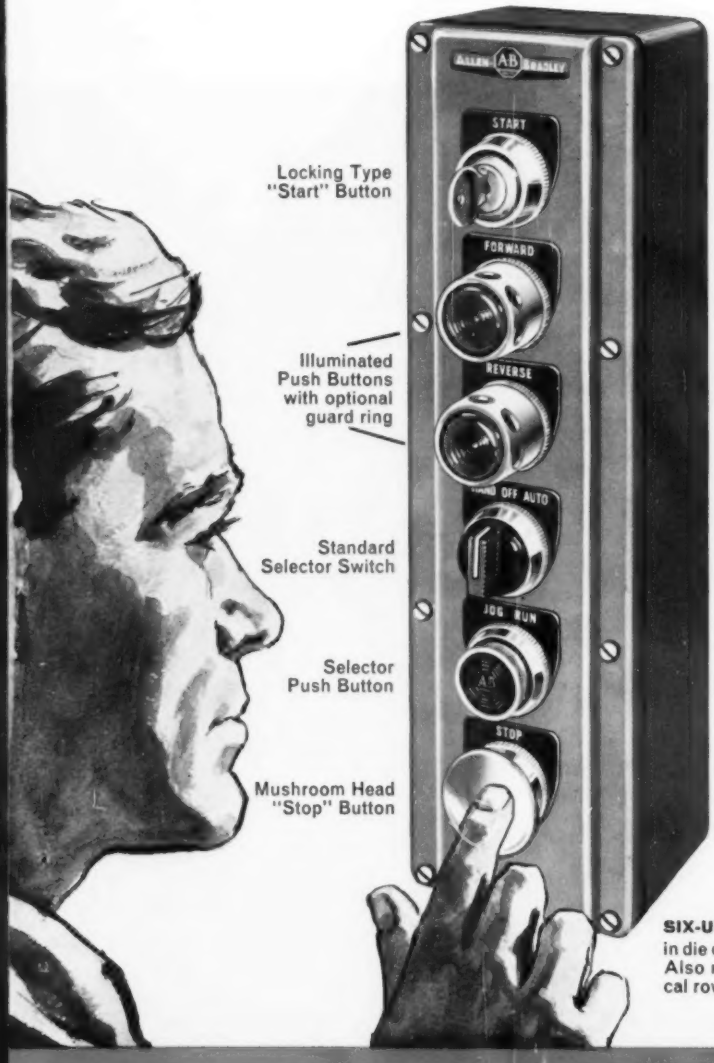
Containing a strong, tough and versatile repair material, an industrial repair kit can repair castings, valves, pumps, patterns, core boxes, molds and all types of industrial machinery. The process for making repairs with this kit is simple. The kit consists of two self-measuring tubes of material. Equal lengths of

BE SURE YOU GET

Quality Appearance Quality Operation

Specify Allen-Bradley's line of **OILTIGHT CONTROL STATIONS**

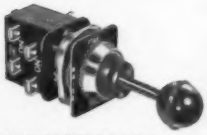
Allen-Bradley oiltight units and stations harmonize with the trim lines of modern machine tools —they look as if they were a part of the machine. Also, from the wide selection of control units, you'll be able to satisfy every operating requirement. A-B control units are positively oiltight—impossible for oils and cutting fluids to foul the contacts. And the silver contacts assure reliable operation. The rugged construction and generous wiring room of all A-B stations are valued by the installation engineer. Insist on Allen-Bradley pilot control units and stations—you can't make a mistake! Send for Publication 6090.



FLUSH HEAD
push button, also made with extended head.

WING LEVER PUSH BUTTON
Combines push button and selector switch.

PUSH-TO-TEST PILOT LIGHT
Six different color lenses available.

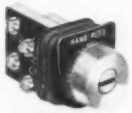


4-WAY SELECTOR SWITCH
Also furnished for 2-way operation.

PILOT LIGHT
Transformer or full voltage types.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.

PILOT LIGHT CLUSTER
Four lights of different colors in one unit.



SELECTOR SWITCH
With coin slot operator. Other operators available.

CONVENIENCE RECEPTACLE
For plugging in work light or small tools.

SPECIAL CONTROL CONSOLES
can be furnished to meet your exact operating requirements.

SIX-UNIT CONTROL STATION
in die cast aluminum housing. Also made with up to 4 vertical rows with 4 units per row.

31-60-RH

ALLEN-BRADLEY

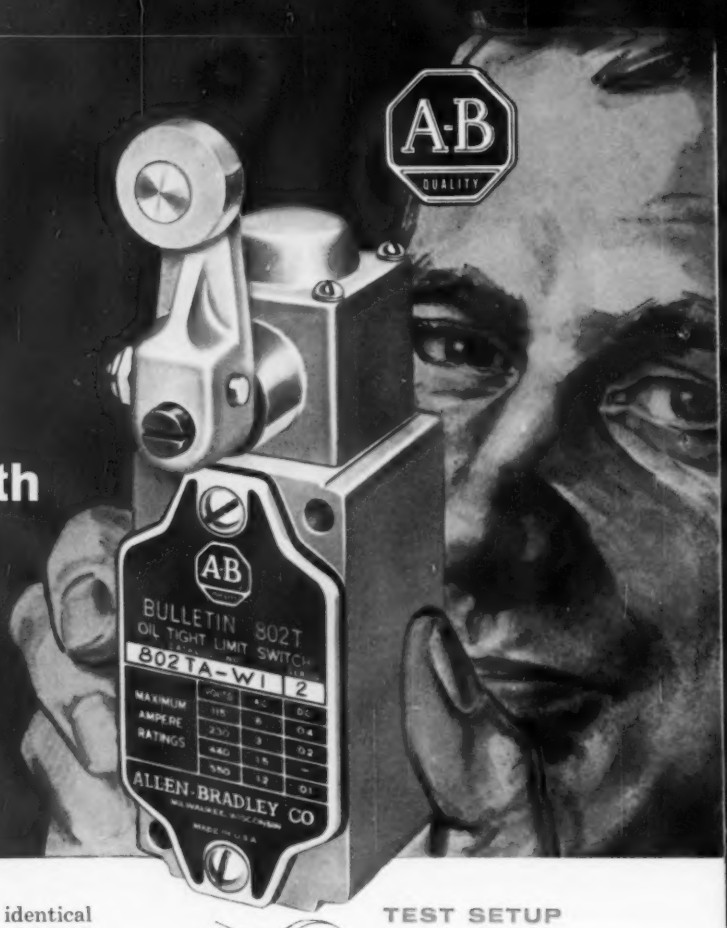
Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

Only ALLEN-BRADLEY LIMIT SWITCHES FINISHED TEST with *NO FAILURES!*

. . . and remained good for many more millions of trouble free operations

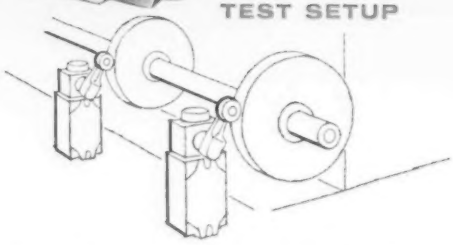


Recently, a large user of limit switches selected two identical units from each of five leading manufacturers and subjected them to the same accelerated life test. When the test was stopped after many, many millions of operations, only Allen-Bradley Bulletin 802T oiltight limit switches were left *with no failures!* Also, a careful inspection of these two Bulletin 802T limit switches suggested that they were still good for *many more millions* of operations.

The Allen-Bradley "built-in" quality is the reason for such unmatched performance. With switch bodies and operating heads positively sealed against oil and dirt, A-B Bulletin 802T limit switches are free from contact fouling and sluggish operation. The precision switch mechanism has a positive snap action—it is impossible for vibration to cause contact chatter. The double break, silver contacts never need servicing.

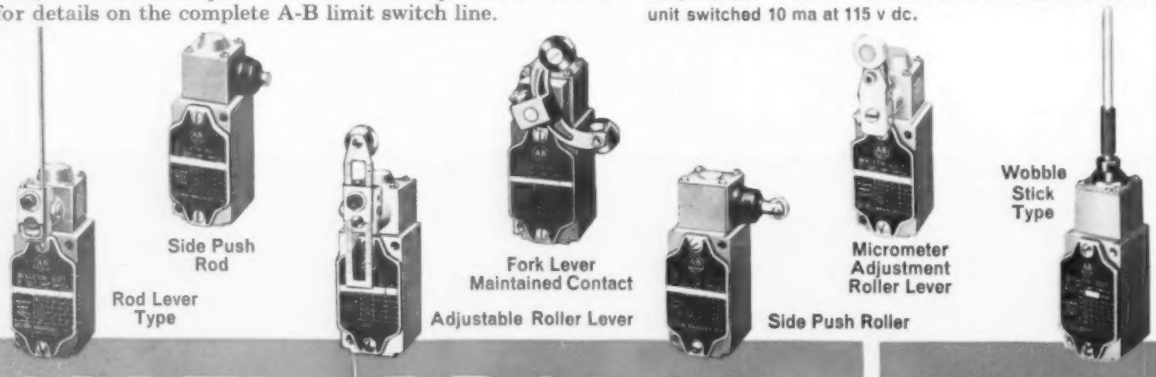
Insist on Allen-Bradley Bulletin 802T oiltight limit switches—they will *always* provide you with the long, trouble free life that is so important to continuous production. Send for details on the complete A-B limit switch line.

TEST SETUP



Purchased through regular supply channels . . .

and tested under identical conditions, insuring an impartial evaluation of performance. Of the ten limit switches tested (two each of five different makes), only three were operating when the test was stopped. Two were A-B Bulletin 802T switches and one of another make, of which the second unit had failed early in the test. On this accelerated life test, one unit switched 1.0 ma at 115 v dc while the other unit switched 10 ma at 115 v dc.



ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Titanium

Titanium and its alloy tubing are described in a data memorandum. The memo lists the chemical composition, physical properties, mechanical properties and size limits for seamless tubing. (Superior Tube Co.)

For free copy circle No. 1 on postcard

Punch Point Sizes

A folder and catalog describes the firm's new concept of proven usage punch sizes. The folders point up the lack of standardization for punch point sizes. Also presented is how the firm has arrived at a simple system of standards. (Dayton Perforators, Inc.)

For free copy circle No. 2 on postcard

Air Weigh Systems

Amply diagrammed, a four-page brochure describes application and function of air weigh systems. The systems are used for weighing, inventory control, mixing and batching and solids flow control. (Harrob Industries)

For free copy circle No. 3 on postcard

Truck Selection

Meeting the growing challenge of proper truck selection is the subject of an eight-page brochure. The brochure gives the material-handling engineers information which they can retain as a ready reference to their everyday handling problems. (Automatic Transportation Co.)

For free copy circle No. 4 on postcard

Reamers

Fully illustrated, a 16-page catalog covers a line of carbide-tipped expansion reamers, solid reamers, end mills, spotfacers and counterbores. It also reports on special carbide-tipped tools made to specification. (For free copy, write on company letterhead to Carr Tool Co., 3810 Hires Lane, Cincinnati 12.)

Vacuum Forming

A bulletin introduces a machine for general plastic vacuum forming and visual packaging. (Comet Industries)

For free copy circle No. 5 on postcard

Induction Motors

Design features, performance characteristics and size range of a re-designed line of squirrel cage induction motors are contained in a bulletin. The motor is impervious to water, acid, abrasion and mechanical and electrical abuse. (The Lincoln Electric Co.)

For free copy circle No. 6 on postcard

Paper Honeycomb

Strong, lightweight paper honeycomb is dealt with in a booklet. What it is, what it can do and how it can be used are all explained in the brochure. (Hexcel Products Inc.)

For free copy circle No. 7 on postcard

Dry-Type Transformers

Ventilated, dry-type transformers are illustrated in an eight-page bulletin. Some of the items fully described are insulation, core and coil construction, enclosure construction, paint finishes and heat curing processes. (Niagara Transformer Corp.)

For free copy circle No. 8 on postcard

Control Design

Six ways to simplify control design are shown in a comprehensive news bulletin. The literature illustrates various analyzer models used for fast problem solving in servo system design, debugging, produc-

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **12/1/60**

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

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THE IRON AGE
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THE IRON AGE

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NEW YORK 14, N. Y.

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FREE LITERATURE

tion, teaching and testing. Also described is a method of servo system synthesis and analysis. (Servo Corp. of America)

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Ball Valve

Described and detailed in a two-page catalog sheet is a ball valve. The bulletin details the operation of the valve. It shows cutaway views, ratings, describes specific design features and dimensions. (Lunkenheimer Co.)

For free copy circle No. 10 on postcard

Shear Control

A two-page bulletin describes a system for cropping mill slaps more precisely, to result in production increases and scrap reductions. The system enables mill speeds to be maintained at speeds as high as 240 fpm during operations. (General Electric Co.)

For free copy circle No. 11 on postcard

Barrel Finishing

Machines for barrel finishing are dealt with in a four-page brochure. The brochure includes specifications, data and illustrations. "Before and after" illustrations clearly indicate the results that are achieved. (Syntron Co.)

For free copy circle No. 12 on postcard

Conductivity Monitor

Transistorized, continuous-indication conductivity monitors are described in a four-page data sheet. Installation connections for conductivity measurement systems, circuit diagrams and pertinent features are described for two types of monitors. (Leeds & Northrup Co.)

For free copy circle No. 13 on postcard

Accelerometers

Linear and angular accelerometers are described in a four-color, four-page bulletin. It illustrates and describes nine series of linear and angular accelerometers. (Schaevitz Engineering)

For free copy circle No. 14 on postcard

Face Protection

A complete selection of eye and face protection, for a wide variety of industrial applications, is described in a brochure. Highlighted in the 40-page catalog is a line of eyewear. This line combines high optical quality and impact strength in excess of specifications. Vision testing equipment is also reviewed in the catalog. (Mine Safety Appliances Co.)

For free copy circle No. 15 on postcard

Electron Tubes

A 25-page condensed tube catalog contains descriptions and basic specifications on the full line of company tubes. (Amperex Electronic Corp.)

For free copy circle No. 16 on postcard

Colored Aluminum

Fully illustrated, an eight-page booklet contains color swatches of all 20 standard colors offered in a pre-colored aluminum sheet line. Detailed description is given on how it is made. (Reynolds Metals Co.)

For free copy circle No. 17 on postcard

Cradle Idler

A brochure gives complete information on a cradle idler and belt conveyor. The literature gives a description, photographs, dimensional drawings and capacity tables of the idler, idler H-frames and belt conveyor. (The McNally Pittsburg Mfg. Co.)

For free copy circle No. 18 on postcard

Electric Truck

Profusely illustrated, a four-page folder illustrates and describes a 2000-lb capacity electric truck. The folder gives engineering drawings, charts and photographs. Detailed specifications, design and operating information are also included. (Elwell-Parker Electric Co.)

For free copy circle No. 19 on postcard

Custom-Produced Glass

The engineering and manufacturing service of the manufacturer is described in a 20-page brochure. It includes full color photos of products used in street and highway traffic control; also industrial globes, indicator lenses and color filters. (Kopp Glass, Inc.)

For free copy circle No. 20 on postcard

Two-Color Pyrometer

An automatic, two-color pyrometer is described in a four-page brochure. The brochure gives complete descriptive details, general specifications on standard models and special features. In addition, photographs of the sensing head and control units are also contained. (Shaw Instrument Corp.)

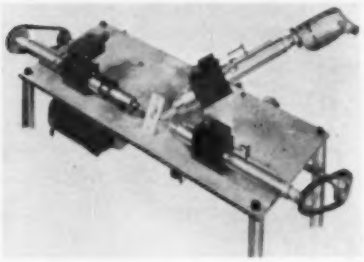
For free copy circle No. 21 on postcard

each of the two materials are squeezed from the tubes. They are then mixed with a wooden paddle included in the kit. The mixture is then applied to the casting or part to be repaired. The mixture does not shrink. (Devcon Corp.)

For more data circle No. 63 on postcard, p. 159

Multi-Angle Drill Unit

With a drill capacity of ½-in. in steel, a multi-angle drill unit provides unlimited mounting flexibility to handle angle or off-line drilling lines. The unit incorporates a two-

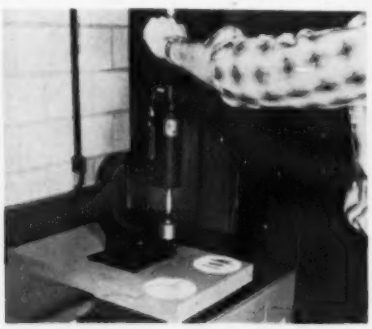


way air cylinder which provides both feed and return of the spindle. Any length stroke may be set up to the unit's full 4-in. capacity. (Commander Mfg. Co.)

For more data circle No. 64 on postcard, p. 159

Sample Pulverizer

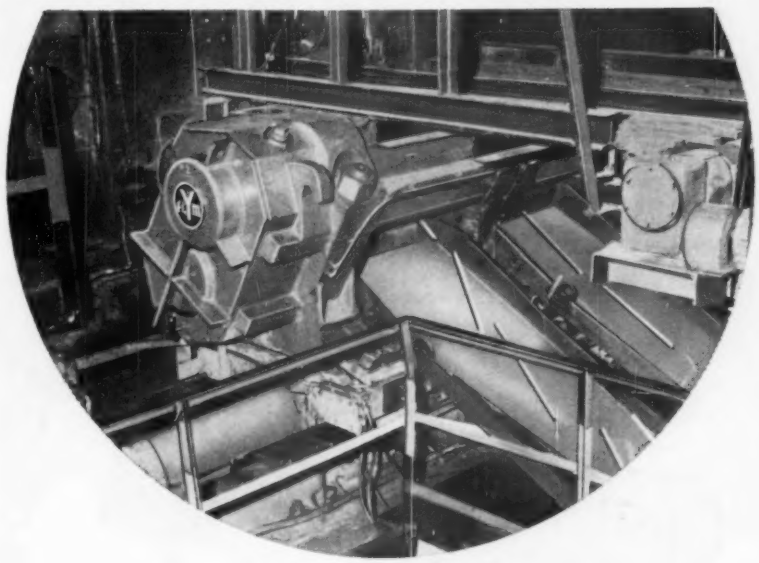
Fast and powerful, a sample pulverizer gets quick chemical analysis of metal samples. The unit uses an air powered spinner riveter with mortar pestle to receive and pulverize samples. With this, a



more accurate determination is provided. Samples from foundry pourings are cooled, then inserted in the mortar. The pulverizer is then actuated by a hand lever. The sample is pounded and spun on

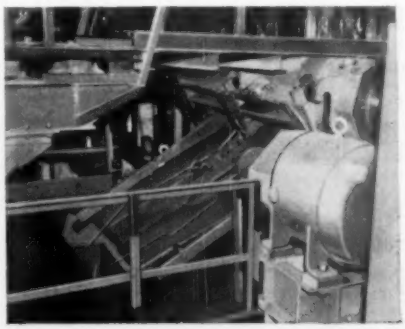
"YOUNGSTOWN"

Rotary-Type PLATE SCRAP CHOPPER



Unique Reciprocating Design prolongs knife life . . . saves downtime

Here's the scrap chopper designed for ruggedness and efficiency . . . built by "Youngstown" for a leading steel company. It handles side trimmer scrap 3" wide, ⅛" to ½" thick and cuts to 14⅛" constant length at speeds of 45 to 180 fpm. This rotary type scrap chopper is also built for ¾" and 1" thick plate; it can be built integrally with a side trimmer for a new line or application.



Scrap sliding down exit chutes from rotary chopper onto conveyor which discharges into scrap box or railroad car.

The arbor and housing assembly is designed as a separate unit mounted on a motor driven reciprocating carriage. Each arbor is equipped with four 30" long knives, with the knives so spaced that only one side is cutting at a time. This feature, along with the reciprocating action, insures longer time between knife dressings.

This design provides a spare housing and arbor assembly so that knives can be changed or adjusted on the floor, saving valuable mill time while changing knives. Housing and arbor assembly change time is held to a minimum through fast disconnect from drive and reciprocating carriage. Write for complete information.

THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1900

The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

Choice of the wise buyer who compares...

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CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

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CM HOISTS

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COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

each stroke. A finely crushed sample is the result. It is easily workable for chemical determination of carbon content. The unit will also pulverize samples for phosphorous, manganese, nickel and chromium determinations. (Gardner - Denver Co.)

For more data circle No. 65 on postcard, p. 159

Electric Drill

Using a motor that delivers 23 pct more horsepower, a compact, high-stall torque ⅜-in. electric drill runs at 850 rpm, free speed. It weighs only 4¾ lb. High stall torque makes the drill well suited

for drilling stainless steel and other tough alloys. Another use is for wire-brush work in preparing rusted and scaled surfaces for welding. (Thor Power Tool Co.)

For more data circle No. 66 on postcard, p. 159

Soldering Machine

Featuring a positive timing control circuit, a soldering machine is for production assembly of multi-pin connectors. It insures accurate wiring with no cold solder joints. A programming system gives a

visual indication of the connector pin to be soldered; also the color and number of the wire to be soldered to that pin. A convenient footswitch advances the program to the next pin when soldering has

been completed. The timing circuit provides a uniform heating period to every solder joint. Accessories for the unit permit use of this machine as a general-purpose soldering tool. (Virginia Electronics Co., Inc.)

For more data circle No. 67 on postcard, p. 159

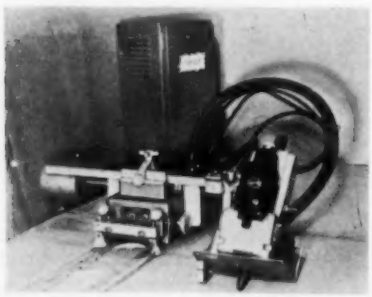
Shell Sand Coater

For resin coating sand to be used in shell core molding, a shell sand coating plant is completely wired and piped. At installation, all that is required is the connecting of air lines and electric power to the control panel. A liquid resin measuring and injection unit gives automatic control of amount used. It eliminates loss from spillage. (The National Acme Co.)

For more data circle No. 68 on postcard, p. 159

Automatic Torch

A heavy-duty torch automatically groove seams and prepares the edges of heavy plate for welding. It enables production of "U" groove plate preparation by butting square-edged plates together; also by producing the desirable "U" groove in two plates in one operation. Its fast travel speed and low heat input

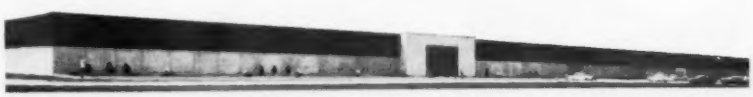


keep plate distortion to a minimum. The complete unit consists of a tractor-driven automatic head. The head features all position adjustment of electrode angle and variable electrode feed. The unit is designed to use electrodes ranging in size from ¼ to ⅝ in. maximum diam. (Arcair Co.)

For more data circle No. 69 on postcard, p. 159

Parts Washer

A general-purpose, high-pressure safety solvent parts washer cleans



THE AIR IN THIS PLANT IS CLEANER THAN THE AIR A MILE ABOVE IT

The air in this plant **has** to be clean, because they make precision electronic parts here. It is the Collins Radio Company manufacturing plant in Cedar Rapids, Iowa . . . completely air-conditioned, and electronically air-cleaned with Westinghouse Precipitron®. Collins finds that clean, controlled air pays for itself in fewer rejects, more reliable products, and in reduced absenteeism. Write for our booklet describing the advanced air engineering concept Collins has adopted – based on Westinghouse air handling and air cleaning products. Dept. LI08, Sturtevant Division, Hyde Park 36, Massachusetts. YOU CAN BE SURE . . . IF IT'S Westinghouse

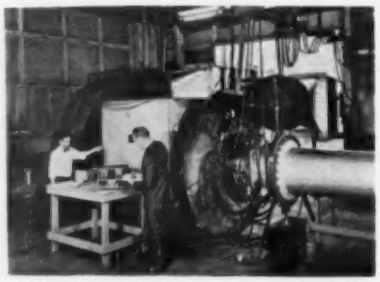
J-80708

greasy, dirty parts of all kinds. An outside manually-controlled turntable and rotating window allow application of solvent under high pressure. This can be done from any angle while loading door is closed. The turntable will support 2000 lb. Solvent is constantly strained and re-used while fumes are exhausted to the outside. An easily accessible sump collects dirt. (Flinchbaugh Electric Co.)

For more data circle No. 70 on postcard, p. 159

Dual Compressor

For an iron ore pelletizing furnace, a large dual compressor unit provides both combustion air and cooling air. The equipment consists basically of a pair of centrifugal compressors driven by a common double-end electric motor. The larger of the two blowers provides combustion air for furnace operation. The smaller provides air for

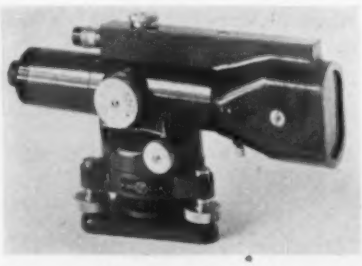


cooling pellets as they are discharged from the furnace. The combustion air compressor is an 885-hp unit having a rate capacity of 31,500 cu ft per minute. The cooling air blower is a 425-hp unit having a rated capacity of 28,100 cu ft per minute. (American Standard Combustion Div.)

For more data circle No. 71 on postcard, p. 159

Optical Level

Even when its telescope is tilted, a self-setting optical level maintains a level line of sight. The device consists of a fixed prism rotating above two swinging prisms. The fixed prism gives an erect image. Frictionless suspension insures a repetitive setting action closer than 1 second of arc. The instrument reads directly to 0.001 in. over ½ in. Its focusing range is 6 ft to infinity. The telescope body is moisture proof and dust proof. (Engis Equipment Co.)



For more data circle No. 72 on postcard, p. 159

Unit Swings Drums

For galvanic baths, an automatic swinging drum apparatus has a special automatic timer to control the immersion time. The unit consists of two tanks, arranged one behind the other. There is a rotating

WASHERS

and the case for high-strength steel bolting

Structural engineers, architects and contractors are increasingly aware of the superiority of high-strength bolted steel construction . . . in preference to riveting. Speed, economy, quiet, higher fatigue resistance and permanent joining result.

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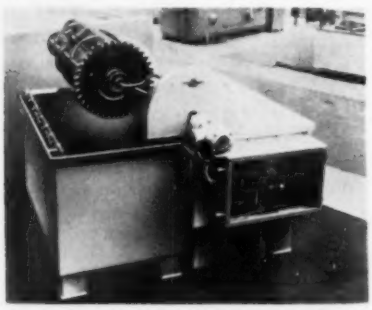
drum above. The forward or sheet-metal tank contains the rinsing water. The rear tank holds the galvanic bath solution. Wire glass lines this rear tank. It suppresses the generation of stray currents in the alkaline bath. The pentagonal-

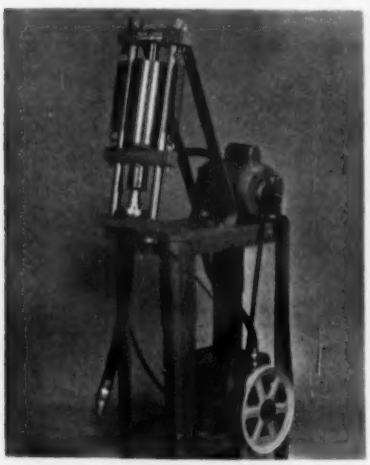


shaped swinging drum is made of specially-treated plastic. (Netherlands Trade Commission)

For more data circle No. 73 on postcard, p. 159

Hose-Coupling Machine

Reducing breakdown time, a machine simplifies hose inventories. It repairs or makes up hydraulic or gas hose in one minute. It can also be equipped to make battery cables, rivets combine and mower knife sections; guard plates as well as



other riveting operations. It will also do many small press jobs such as bushings and bearings. (Manufacturers Assoc., Inc.)

For more data circle No. 74 on postcard, p. 159

Portable Dumper

A portable dumper turns over 200-lb cartons so the contents can be dispensed through an iris valve. The forks of the dumper, similar to a lift truck, are pushed under the carton. It is then tilted by the actuator until the carton is clear off the floor. The dumper with the carton is then wheeled to a dispensing area and the actuator furnishes power to turn the carton over 180°. (Ex-Cell-O Corp.)

For more data circle No. 75 on postcard, p. 159

Drill-Press Vise

Designed for light milling, drilling, tapping, grinding and assembly work, a drill-press vise has mounting lugs for bolting to a machine

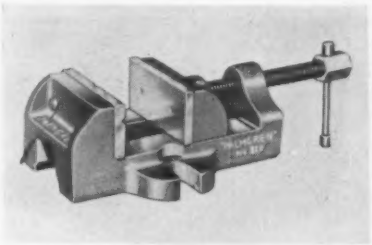


table. The vise has 1½-in. jaw width, opens 1½ in. with removable

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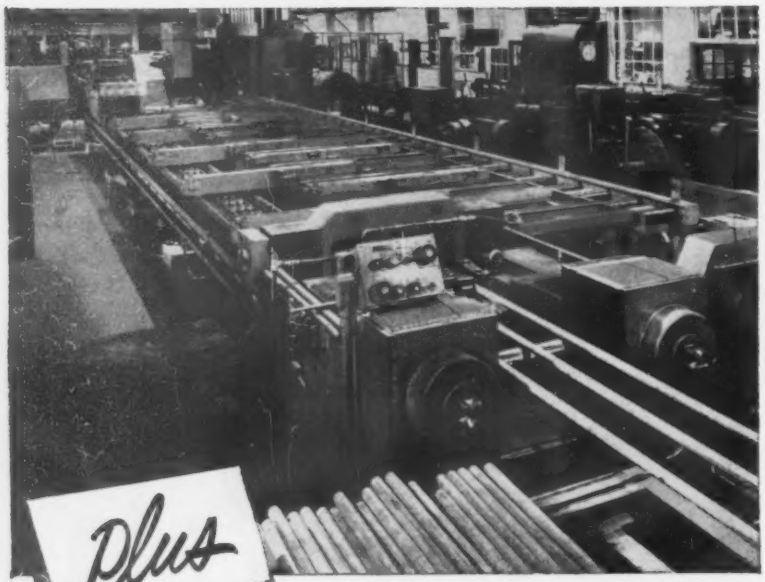

Plus

CONSTANT QUALITY AND METALLURGICAL CONTROL in every step of processing

. . . assure positive uniformity from bar to bar—order to order

Four modern, well-equipped mills at Ambridge, Pa.; Chicago, Ill.; Newark, N.J.; and Putnam, Conn., insure prompt deliveries and service for all of your cold drawn steel requirements.

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WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

NEW EQUIPMENT

ground steel jaw plates 1-in. deep. One plate is plain; the other is "V" grooved horizontally and vertically for holding round work. The vise is accurately machined of semi-steel grey iron castings. (Chicago Tool & Engineering Co.)

For more data circle No. 76 on postcard, p. 159

AC-DC Welder

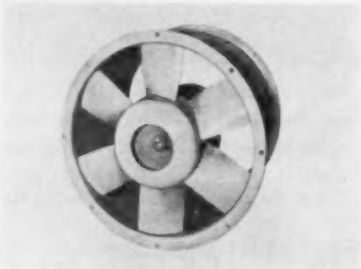
With three-phase input, an ac-dc arc welder has circuits that use the three-phase power to provide both the ac and dc outputs. The outputs

have a range of 6-400 amp dc, 6-250 amp ac. Full single range operation on ac and dc permits the use of standard company slope controller, without limitation due to range switches. Adjustable controlled arc characteristics maintain dual continuous control on both ac and dc. (Vickers Inc.)

For more data circle No. 77 on postcard, p. 159

Ventilation Fans

Direct-driven and belt-driven axial flow fans, for general ventilation, remove dust and fumes. Capacities at zero static pressure range from 3220-72,500 cu ft per minute.



Features include: airfoil fan wheels, flanged heavy-gaged fan casings, sealed pre-lubricated self-aligning

bearings and improved capacity per horsepower. (L. J. Wing Mfg. Co.)

For more data circle No. 78 on postcard, p. 159

Vacuum Forming

For the plastic and packaging industry, a vacuum forming machine produces quality vacuum-formed parts. It operates "around the

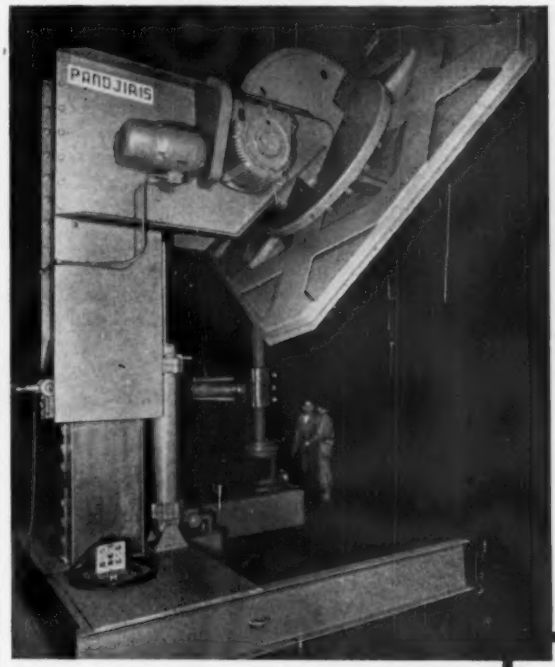
clock" with ease and economy. Material can be fed into the machine manually for small runs; automatically for high production. The machine has single switch dialing for all functions. It has a completely adjustable 16-in. drape stroke. Another of its many features is that all functions are operated by one eight-position switch. (Pacific Plastic Machinery, Inc.)

For more data circle No. 79 on postcard, p. 159

Dust Collectors

Self-cleaning, a line of automatic dust collectors operates at maximum efficiency without interruption. The continuous operating and cleaning cycles, together with high efficiency, make the unit ideal for use in metal processing and manufacturing processes. The unit's construction is 3/16-in. polished aluminum. The modular sections of the dust collectors permit adaptation to varied dust collecting and space requirements. Each model is 5-ft deep and 15 ft 6-in. high. (Torit Mfg. Co.)

For more data circle No. 80 on postcard, p. 159



Put 20 tons where you want it

Position of the work is mighty important when welding. This 20-ton capacity positioner tilts, rotates and elevates automatically. Two standard Cone-Drive **double-enveloping worm** gear reducers provide the drive and tuck away compactly under the table.

Compact Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

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DIVISION MICHIGAN TOOL CO.
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MULTIPLE SPINDLE
CHUCKING MACHINES
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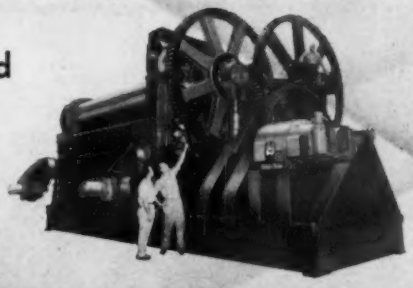
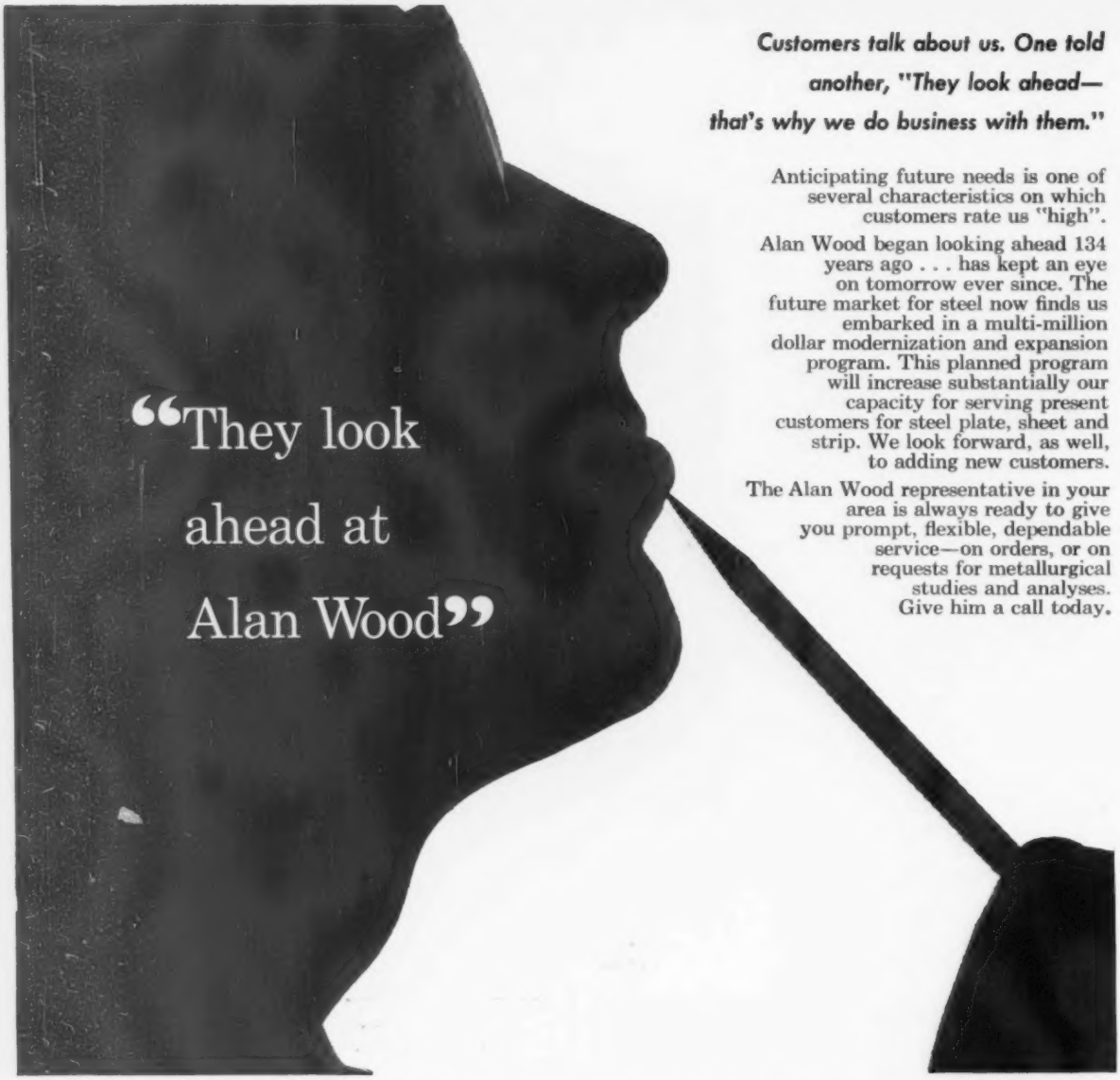
INITIAL PINCH TYPE PLATE BENDING ROLL
Capacity to 6 inch plate cold
The LARGEST ever built



Our Line
Light and heavy machinery for all classes of sheet metal, plate and structural work

BERTSCH & COMPANY, CAMBRIDGE CITY • INDIANA



Customers talk about us. One told another, "They look ahead—that's why we do business with them."

Anticipating future needs is one of several characteristics on which customers rate us "high".

Alan Wood began looking ahead 134 years ago . . . has kept an eye on tomorrow ever since. The future market for steel now finds us embarked in a multi-million dollar modernization and expansion program. This planned program will increase substantially our capacity for serving present customers for steel plate, sheet and strip. We look forward, as well, to adding new customers.

The Alan Wood representative in your area is always ready to give you prompt, flexible, dependable service—on orders, or on requests for metallurgical studies and analyses. Give him a call today.

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The Iron Age Summary

Little Change Since Last June

Except for seven months of low operations in 1958, this year's steel decline has been the worst and longest since the 1930's.

Feeling now is that the low point, because of seasonal factors, will be December. The market actually has been on true bottom since late June.

■ The steel industry this week enters its sixth consecutive month of operations at close to 50 pct of capacity. And there are no indications of any significant change until well into 1961.

This compares with 1958, when steel operations ranged mostly in the 50's for a period of seven months. Otherwise, it is the longest period of sustained low operations since the 1930's.

True Bottom—Except for a few false starts, the industry has been on a true bottom since the end of June. Weekly operating rates have not varied more than a few points. The rate of new orders booked by the major companies has also stayed level through the summer and autumn.

Now, with a negative seasonal factor to contend with in December, orders in the past week have been little better than enough to sustain a 45 pct rate of operations in the major companies. This puts December in line to be the poorest month of the year.

Lethargic Buyers—In isolated instances, improved orders and mild traces of optimism are observed. But these tend to be local in nature and subject to regional influences. The major markets show little resiliency for the next few months.

These include appliance makers, farm implement and construction equipment manufacturers, warehouses, construction, and the railroads.

Automotive Questions—Automotive remains a question mark. At the moment, ordering from the big automakers is non-committal, although this could be the most volatile factor in the steel market.

Auto production in November will hit around 590,000 cars, with original December schedules calling for about the same. However, some slack at Chrysler Corp. and Studebaker-Packard indicate that the schedule is not likely to be filled.

Reasons to Hope — However, there is some encouragement on the basis of January automotive steel orders. Setbacks are about completed and cancellations may be ending. January buys look good for General Motors, with encouraging orders from Fisher Body, GM's body-making division. Ford also looks like it may pick up its buying.

In a number of markets, sources believe the low point will be passed in December with January showing some improvement. Advance ordering does show improvement for scattered products and diverse markets.

In another area, mills are cheered by the negative fact that orders have not dropped off as expected. This doesn't mean any improvement in the near future, but the stage is being set for a good pickup when things start to move.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,404	1,367	1,478	2,650
Ingot Index				
(1947-1949=100)	87.4	85.1	92.0	165.0
Operating Rates				
North East Coast	50.0	47.0*	54.0	100.0
Buffalo	48.0	49.0*	59.0	103.0
Pittsburgh	47.0	46.0*	48.0	96.0
Youngstown	34.0	27.0	42.0	92.0
Cleveland	51.0	54.0*	59.0	93.0
Detroit	65.0	67.0*	64.0	97.0
Chicago	51.0	53.0*	52.0	92.0
Cincinnati	52.0	54.0	58.0	88.0
St. Louis	59.0	50.0*	73.0	110.0
South	54.0	52.0	52.0	87.0
West	49.0	46.0*	46.0	91.0
U. S. Rate	49.3	48.0	51.9	93.6

*Revised

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.32	$66.32	$66.32	$66.41
Scrap No. 1 hvy (Gross ton)	$28.50	$28.33	$29.50	$43.50
No. 2 bundles	$18.50	$18.50	$19.83	$29.83
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	30.00	30.00	30.00	33.00
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	102.75	103.25	103.125	100.00
Zinc, E. St. Louis	13.00	13.00	13.00	12.50

Streamlined Buying Pays Off

Clinton Bishop, purchasing agent for Alan Wood Steel Co., uses simple approaches to do a complex job well.

Even capital equipment negotiations have been streamlined.

■ Clinton Bishop's uncluttered desk reflects his purchasing philosophy. He runs a streamlined, flexible department with objectives clearly in mind at all times.

Example: There are no expediters in Alan Wood's purchasing department. Buyers do their own expediting.

Mr. Bishop can quickly and clearly state why this set-up exists.

"The purpose of expediting is to get delivery of ordered material when it is needed. Our experience has shown that buyers are most effective in doing this job. Suppliers realize that the man at this end of the telephone is the man who will place the next order.

"And suppliers like the arrangement. They are not hounded by someone whose only job is to push for delivery. The idea works well."

Organization Aids—Mr. Bishop implements his expediting plan with organization to help it run smoothly. All buying personnel have their own secretaries. One of the jobs of these girls is to keep up-to-date the open-order books that buyers use for expediting reference.

Two assistant purchasing agents and three buyers, along with Mr. Bishop, do the buying for Alan Wood. Their purchases amount to approximately $55 million annually. The company employs 4000, including those at a manufacturing subsidiary and at a mining operation in New Jersey.

Even in the often complex area of capital equipment purchase negotiations, Mr. Bishop uses a streamlined but effective approach.

The Alan Wood purchasing chief is a member of the company's Expenditure Planning Committee. This committee approves all expenditures and capital investments in excess of $1500.

Open Bidding—When a decision has been made to buy capital equipment, Mr. Bishop's buyers secure bids based on compliance with engineering specifications. Purchasing insists that, where possible, these specifications not be drawn so that only one source can quote.

When bids are received, they are passed to engineering—with prices omitted. Engineers then indicate those that are suitable, based on compliance with specifications and quality and performance ratings.

These selected bidders are notified by purchasing that they are "in the running." Once they know their bid is being given final consideration, many vendors are able to closely review their bids and sharpen them further. Or a bidder with a low price, but a minor exception in his bid, may remove this exception in a re-submitted bid.

When one bidder re-submits a bid, all other vendors in the running are notified and allowed to do the same.

Big Savings — Mr. Bishop contends this "element of negotiation" has often resulted in substantial savings to Alan Wood. Vendors, completely informed of the ground rules, feel the system is "tough but fair."

Mr. Bishop is a member of the 12-man Executive Committee of the National Assn. of Purchasing Agents. This is the top ruling body of the group.

CLINTON BISHOP: "Our flexible plan has paid off in today's market."

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

This 12-inch billet was cut in 14 minutes!

This speed is standard procedure with CAMPBELL wet abrasive cutting machines. The 14-minute example refers to a semi-finished carbon steel billet, but it's just as true for other metals. Even Rene 41 and Inconel X can be cut at 7 to 10 square inches per minute.

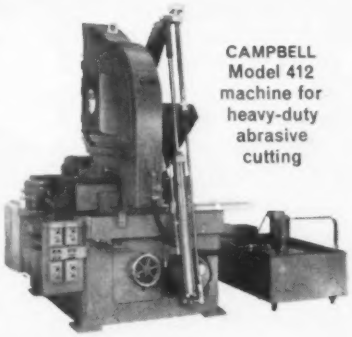
You get top quality, too • No burn, a surface suitable for metallurgical examination, and dimensional accuracy with modern abrasive cutting techniques.

The most economical way to cut • It's not uncommon to reduce cutting time from hours to mere minutes with CAMPBELL machines. Wheel cost is low, too.

Machines for heavy-duty jobs • ALLISON-CAMPBELL offers a wide selection of precision abrasive cutting machines. For the *big* jobs, the recommendation usually is either the CAMPBELL Model 481, with capacity up to 8" squares, or the CAMPBELL Model 412, which can cut 12" squares. Both of these machines have a unique coolant system for greater accuracy, better-quality cuts. Oscillation (the backward and forward motion of the wheel as it cuts through the work), speeds up production, increases wheel life.

For other cut-off jobs, there are four types of CAMPBELL machines in both wet and dry cutting models, with capacities and speeds to suit your own production needs. ALLISON-CAMPBELL also can supply the right wheels for any cut-off job.

Write for details. *For on-the-spot help, call in your* ALLISON-CAMPBELL *field engineer. He's an abrasive cutting specialist, ready to give expert advice.*



CAMPBELL Model 412 machine for heavy-duty abrasive cutting

Send us a sample

Send us samples of the materials you cut. We will make test cuts in our Abrasive Cutting Laboratory and return the samples to you with complete test data.

ACCO

CAMPBELL ABRASIVE CUTTING MACHINES

Allison-Campbell Division • American Chain & Cable Company, Inc.

927 Connecticut Avenue, Bridgeport 2, Conn.

Warehouses See Only Negative Signs

Steel service centers see only negative factors at work in the market for the next few months.

Even small order business has fallen off. And usually strong industries are cutting back.

■ Steel service centers are drawing little encouragement from the market outlook. One reports that the past three months have been very poor — and December looks no better.

Prices have deteriorated. Customers are shopping around, and suppliers are bidding against each other. Midwest warehouses are stretching inventory cutback plans well into the first quarter of 1961.

Negative Signs—In the past, recessions have brought a heavy flow of small orders. But in the past week or two, the volume of small orders has fallen off. And the drop-off appears to be right across the board.

Mild bar gains have been wiped out. Plate is a dead item. Structurals are declining seasonally. Big industries that traditionally do their heavy manufacturing during the winter are cutting back—and these cutbacks are usually felt first at the warehouse level.

However, it's generally agreed that a firm upswing in business will produce an immediate and disproportionately high recovery in warehouse business. But there are no signs it will happen within the next two months.

Sheet and Strip—Mills are taking encouragement from the fact that some users are placing orders now for January steel. However, the practice isn't widespread. For the most part it is confined to automotive. Cancellations and cutbacks have slowed, also a welcome sign. But salesmen in Detroit don't expect automakers to start adding to steel inventories until the steel operating rate moves up enough to stretch delivery promises.

Sheet mills in **Pittsburgh** say there are isolated bright spots but still no sustained upward trend. They don't expect this to improve this month or next. Non-automotive sheet customers continue to lag.

Buying is spotty and landing an order still depends on how fast delivery can be made. A **Cleveland** salesman reports losing a 50-ton order for hot-rolled sheet because delivery would take two weeks.

Mills in **Chicago** are heartened by some forward ordering for the first time since July. Flat-rolled products are being ordered into January. But there is nothing cheering in the fact that appliance manufacturers have joined automakers in cancelling some steel and pushing back some other steel for a month.

Plates and Shapes — Plate has been sitting on bottom for quite a while, but structural demand is now falling rapidly. Even wide-flange mills in **Chicago** are getting down to 14 turns or less.

Bethlehem Steel Co. is taking advantage of the lull to close its **Johnstown, Pa.,** plate mill to complete the final phase of a multi-million dollar improvement program. To be installed are a new roller leveler for straightening plates, cooling bed, marking machines, roller tables and plate positioning equipment. The mill will be down about four weeks.

Tinplate—Among the hardest hit products at the moment, tinplate shipments have fallen more than seasonally. **Pittsburgh** mills are carrying heavy stocks. However, mills are confident of a first quarter upturn. Experience in past slumps has shown the first quarter almost always shows an improvement.

Bars—The market picture is spotty. A **Pittsburgh** producer of cold-finished bars says an upturn could come in January, but concedes there is no sign this will happen.

Reports from **Detroit** indicate the automotive buy for January seems relatively light. Chevrolet has come in with some full orders, but Ford's buy is only 75 pct of normal, and small customers aren't interested.

Automotive forging suppliers are holding up an otherwise slow market in **Cleveland.** But users are operating with slim inventories, forcing mills to carry high inventories of semi-finished materials.

Brief gains recorded in **Chicago** a month ago have been cancelled out the current lack of orders.

Wire—This product is still in its seasonally low period. **Cleveland** mills say the only major market support is coming from automotive and upholstery customers.

Pipe and Tubing—The pipe market is universally flat. And the prospects aren't getting any better. An **East Coast** mill found a large order for transmission pipe on its books. But the order was four years old—dating back to a period when linepipe was a quota item. The customer was asked if it wanted to cancel. It did.

PURCHASING AGENT'S CHECKLIST

The second round of labor cost increases in the steel industry takes effect today. P. 98

Industry is the biggest user of silver. But stockpiles will be depleted within two years. P. 101

The machine tool industry has been hit with cancellation of some major projects. P. 113

COMPARISON OF PRICES

(Effective Nov. 29, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Nov. 29 1960	Nov. 21 1960	Oct. 25 1960	Dec. 1 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	**80.00**	**80.00**	**80.00**	**80.00**
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Nov. 29 1960	Nov. 21 1960	Oct. 25 1960	Dec. 1 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.11	$70.11	$70.11	$70.57
Foundry, South Cin'ti	71.92	71.92	71.79	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	69.61	69.61	66.91	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.32	$66.32	$66.32	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$26.50	$26.50	$28.50	$44.50
No. 1 steel, Phila. area	33.50*	33.00	33.50	44.50
No. 1 steel, Chicago	25.50	25.50	26.50	41.50
No. 1 bundles, Detroit	21.50	21.50	23.50	41.50
Low phos., Youngstown	28.50	28.50	27.50	48.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	55.50
No. 1 mach'y cast, Phila.	47.50	47.50	48.50	54.50
No. 1 mach'y cast, Chicago	41.50	41.50	41.50	62.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$28.50*	$28.33	$29.50	$43.50
No. 2 bundles	18.50	18.50	19.83	29.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	33.00
Copper, Lake, Conn.	30.00	30.00	30.00	33.00
Tin, Straits, N. Y.	102.75†	103.25	103.125	100.00
Zinc, East St. Louis	13.00	13.00	13.00	12.50
Lead, St Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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* Appears in the Nov. 24-Dec. 8 issues.

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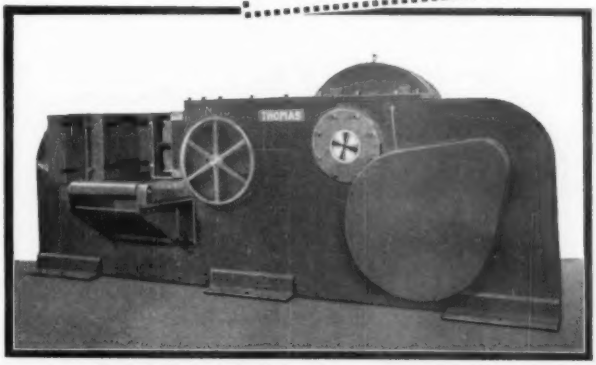
Bars, Billets, Structurals, Rails, etc.



Write for Bulletin 315

The Thomas all-steel Bending and Straightening Machine is built in six sizes, varying from 50 to 400 tons. It does the job quickly and efficiently either *before* or *after* fabricating.

• *Rams are quickly and easily adjustable by means of convenient handwheel so located that operator has unobstructed view of work.*

THOMAS MACHINE MANUFACTURING CO.
PITTSBURGH 33, PA.

64

Market Enters A Quiet Period

The scrap market has generally leveled off and most areas report that there should be little change before January.

In some areas, however, dealers are still pessimistic and look for lower prices.

■ The scrap market has leveled off at its low ebb and the general feeling is that only minor changes will be felt through the rest of the year.

The overall market continues dull and quiet with only scattered price changes.

The New York market, however, is still reported to be soft with prices teetering. Most scrapmen there are pessimistic about December activity and look for even lower prices.

Other areas report that the bottom has probably been reached and dealers are entering a period of waiting.

Due to a closing spread in the price of No. 1 heavy melting in Philadelphia this week, The IRON AGE composite price for that grade is up to $28.50 from last week's $28.33. However, the composite average for November dropped to $28.33 from October's $29.67.

The story's the same for the composite price of No. 2 bundles. Though the grade remained firm through November at $18.50, it's a drop from October's $20.09.

Pittsburgh — Scrapmen waited this week for auto lists to point the direction of general price movement. Tonnage is again heavy, although down slightly from last month. An extra lot of November scrap was sold by a local auto plant for a little under $29. This was about the same as the main offering brought at the start of the month. In the dealer market, a price of $21 for No. 2 bundles is affording no extra profits for brokers. A price of $22 for a nearby district is putting a little more pressure on the local supply. Dealers were also encouraged when a remote consumer paid $29 for No. 1 heavy melting.

Chicago — New factory lists moved down fractionally from last month's prices. While the heavy tonnage lists were down, there are indications that material moving on smaller tonnage sales actually made a few gains. With scrap collections falling, dealer scrap continues to tighten. And, despite the drop in prices paid for major factory bundles lists, the market generally appears to be tightening.

Philadelphia—The market continues at a "steady-to-stable" pace. Exports continue to be the hub of activity with little domestic tonnage. Dealers generally feel the market will remain the same through December. January could result in a price move in either direction, but few scrapmen are speculating.

New York—The market is soft, with most prices teetering. Looking ahead at December, most dealers and brokers are pessimistic. In fact, the most optimistic view is that things will barely stay the same.

Detroit—A steady market is indicated, although some No. 1 bundle prices were down 50¢ on the closing industrial lists. Scrap shipments in December are slated to fall off from November. One large automaker is reducing its offerings 17 pct. Area mills still show a reluctance to buy from dealers. The forecasts say there will be no real buying before the first of the year.

Cleveland—Early auto lists show a slight drop of about 25¢ per ton from one month ago. The price was about $25.25 on cars. Thus, it would appear that a bottom has been reached for the moment at least.

Cincinnati—The market is still at a low level and will probably remain so until there is a revival of interest by local mills. Dealers are selling only small amounts reluctantly at current prices.

St. Louis—Although there is a fair demand for some cast grades, the market remains slow and quiet. The turnover is limited, but there is no panic to unload material.

Birmingham — An area mill bought openhearth grades at current prices. Otherwise the market is dull. Cast and electric furnace buyers are out of the market and foundries buy very little.

Buffalo — Prices are unchanged and the market remains quiet. Dealers are not expecting any changes in the near future.

Boston—A trickle of export is the only activity in an otherwise dead market.

West Coast — Negotiations are now going on with the Japanese for next quarter's business. The talk is that Japan will increase its orders. However, the present market remains dull.

Houston—The market continues weak with little or no trading. The export outlook for the rest of the year has dimmed somewhat. With the slowdown in the market and the low prices, scrap intake has fallen off.

SCRAP PRICES *(Effective Nov. 28, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	15.00 to 16.00
Low phos. punch'gs plate	32.00 to 33.00
Heavy turnings	23.00 to 24.00
No. 1 RR hvy. melting	31.00 to 32.00
Scrap rails, random lgth.	40.00 to 41.00
Rails 2 ft. and under	45.00 to 46.00
RR specialties	36.00 to 37.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	25.00 to 26.00
No. 1 factory bundles	28.50 to 29.50
No. 2 bundles	16.00 to 17.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Low phos. forge crops	36.00 to 37.00
Low phos. punch'gs plate, ¼ in. and heavier	33.00 to 34.00
Low phos. 2 ft. and under	31.00 to 32.00
No. 1 RR hvy. melting	29.00 to 30.00
Scrap, rails, random lgth.	37.00 to 38.00
Rerolling rails	48.00 to 49.00
Rails 2 ft. and under	41.00 to 42.00
Angles and splice bars	38.00 to 39.00
RR steel car axles	47.00 to 49.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	31.00 to 32.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	75.00 to 80.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast, chem. borings	23.00 to 24.00
Low phos. 5 ft and under	35.00 to 36.00
Low phos. 2 ft punch'gs	38.00 to 39.00
Elec. furnace bundles	34.00 to 35.00
Heavy turnings	25.00 to 26.00
RR specialties	36.00 to 37.00
Rails, 18 in. and under	47.00 to 49.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	36.00 to 37.00
Cast iron car wheels	37.00 to 38.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.50 to $23.50
No. 2 hvy. melting	19.50 to 20.50
No. 1 dealer bundles	23.50 to 24.50
No. 2 bundles	15.00 to 16.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	31.00 to 32.00
Rails, random length	36.00 to 37.00
Rails, 18 in. and under	42.00 to 43.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast.	28.00 to 29.00
Drop broken cast.	43.00 to 44.00

Youngstown

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	21.50 to 22.50
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	28.00 to 29.00

Cleveland

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	17.50 to 18.50
No. 1 dealer bundles	23.50 to 24.50
No. 1 factory bundles	26.50 to 27.50
No. 2 bundles	16.50 to 17.50
No. 1 busheling	23.50 to 24.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	29.00 to 30.00
Low phos, punch'gs plate	24.50 to 25.50
Drop forge flashings	23.50 to 24.50
Foundry steel, 2 ft. & under	25.00 to 26.00
No. 1 RR hvy. melting	27.00 to 28.00
Rails 2 ft. and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Steel axle turnings	20.00 to 21.00
Railroad cast.	41.00 to 42.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	36.00 to 37.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	175.00 to 180.00
18-8 turnings	70.00 to 75.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth.	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	27.00 to 28.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Shoveling turnings	8.00 to 9.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	28.00 to 29.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	37.00 to 38.00
RR specialties	33.00 to 34.00
Cupola cast	38.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	33.50 to 34.50
Cast iron car wheels	33.00 to 34.00
Rerolling rails	44.00 to 45.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	29.00 to 30.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth.	35.00 to 36.00
Rails, 18 in. and under	41.00 to 42.00
Angles and splice bars	37.00 to 38.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 dealer bundles	14.00 to 15.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakabe cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	15.00 to 16.00
No. 1 dealer bundles	21.00 to 22.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	18.00 to 19.00
Drop forge flashings	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Heavy breakable cast.	23.00 to 24.00
Mixed cupola cast.	29.00 to 30.00
Automotive cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	22.00 to 23.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	30.00 to 31.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy melting		$32.00
No. 2 hvy. melting		29.00
No. 1 dealer bundles	$27.00 to	28.00
No. 2 bundles		18.00
Machine shop turn.		14.00
Cast iron borings		45.00
No. 1 cupola cast.	46.00 to	48.00

Los Angeles

No. 1 hvy. melting	$29.00 to	$30.00
No. 2 hvy. melting	26.00 to	27.00
No. 1 dealer bundles	24.00 to	25.00
No. 2 bundles		17.00
Machine shop turn.		12.00
Shoveling turnings		13.00
Cast iron borings		13.00
Elec. furnace 1 ft. and under (foundry)		40.00
No. 1 cupola cast.		38.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	23.00
Bush., new fact, unprep'd.	18.00
Machine shop turn.	10.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

What's Going On In Beryllium?

The beryllium field, with only two major domestic producers, is showing more than usual activity.

Most significant is entry to the field by forces of Pechiney of France, forming a new U. S. company.

Also of interest is new activity in U. S. beryllium ore sources.

▪ The usually quiet beryllium industry has come alive with activity.

Recent activity includes the preparation of a French company to invade the U. S. market, the potential emergence of beryllium mining as a U. S. industry, and acquisition in the field.

Stanley B. Roboff, former head of the beryllium branch of the Atomic Energy Commission, has joined forces with Pechiney of France to form a new company, General Astrometals Corp., Yonkers, N. Y. The new company will initially market beryllium shapes made by Pechiney in France. Gradually, GA will build its own facilities, under Pechiney license and guidance, to produce beryllium domestically.

There Are Problems — This is sure to result in a change in the structure of the U. S. market, but there will be problems and changes aren't likely to occur rapidly.

Working against the new company, until it has its own facilities, will be the 20 pct duty on imported beryllium. This could keep GA from making much of a dent on Brush Beryllium Co., Cleveland, and Beryllium Corp., Reading, Pa., until the market expands.

And this could be important since some government experts say there is enough capacity in the U. S. right now, or under construction, to meet current demand.

Also creating an interest in the industry is the potential emergence of a beryllium mining industry within the U. S. Though this country has been producing only about 5 pct of domestic consumption, discovery of beryllium ore in the old Redskin Mine, Park County, Colo., has many industry leaders thinking along different lines. Other promising properties have also been discovered, including some in Idaho.

However, this ore is somewhat leaner than foreign ores. Before the industry can hope to compete with overseas mining, more advanced extractive techniques must be developed.

Large Tonnages — Nevertheless, foreign ores tend to occur in relatively small quantities, while new U. S. discoveries are large enough tonnages to make large-scale, more economical mining likely.

Other activity within the beryllium industry recently, includes the plans of Brush Beryllium to acquire "a substantial interest" in a new company formed by the merger of two other companies.

The two Salt Lake City companies merging are Beryllium Resources, Inc., and Dynamic Metals Corp. Brush confirms that it is active in the new company which will explore and process beryllium.

Expects To Compete—Mr. Roboff told The IRON AGE that he feels his company can compete for U. S. business, both in current and new markets, under the present price structure. He says GA will be offering "certain things not now available." Among these he lists special tubing and "somewhat ductile" sheet.

A government spokesman notes that Pechiney is making and shaping beryllium somewhat differently than is done by U. S. producers. But, he says, it's hard to evaluate the relative economies of the two methods.

No Immediate Breakthroughs—A spokesman from the Defense Dept. (most beryllium sold in the U. S. goes into projects under defense contracts) indicates that while the future of beryllium looks good, no immediate, big breakthroughs are visible.

However, Brush is predicting another big boost in business for 1961. The company figures it will have sales of approximately $29 million this year. This would be an increase of $12 million from last year. The prediction for 1961: Sales of $40 million.

This would indicate that beryllium people do expect an expanding market. If not a major breakthrough, there appears to be renewed interest in its potential.

Tin prices for the week: Nov. 23—102.75; Nov. 24—HOLIDAY; Nov. 25 — 102.75; Nov. 28—102.75; Nov. 29—102.75*.

*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	30.88	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-180	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/6/60
Zinc, N. Y.	13.50	13.00	1/6/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 178.

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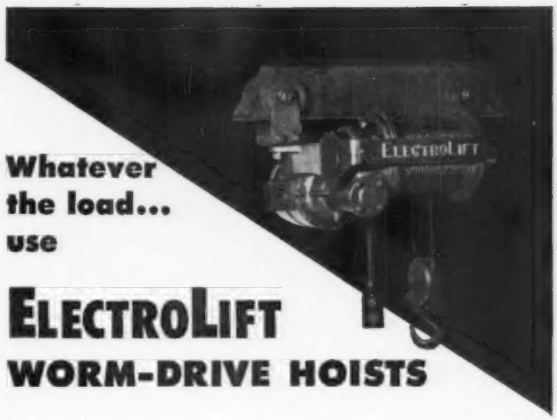

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(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.080-.088	.048-.061	.077-.096	.126-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Muntz Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod 34.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6-75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb).... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb..... 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz... $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.25
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type).. 26.00-27.00
No. 12 alum. (No. 2 grade)... 22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)... 24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

(Effective Nov. 28, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅝	18⅝
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19⅛	18⅝
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	25¼
No. 2 copper wire	23½
Light copper	21¼
*Refining brass	21½
Copper bearing material	20½

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24¼
No. 2 copper wire	23¼
Light copper	20¾
No. 1 composition	20¼
No. 1 comp. turnings	19¾
Hvy. yellow brass solids	15
Brass pipe	14
Radiators	16

Aluminum

Mixed old cast.	12 —12½
Mixed new clips	13½—14
Mixed turnings, dry	12½—13

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	21½—22
No. 2 copper wire	19½—20
Light copper	17½—18
Auto radiators (unsweated)	12½—12¾
No. 1 composition	16½—17
No. 1 composition turnings	15¼—15¾
Cocks and faucets	12¾—13¼
Clean heavy yellow brass	11¾—12¼
Brass pipe	13¼—13¾
New soft brass clippings	13½—13¾
No. 1 brass rod turnings	12½—12¾

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	8½— 9
1100 (2s) aluminum clippings	10 —10½
Old sheet and utensils	8½— 9
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10 —10½

Zinc

New zinc clippings	7 — 7¼
Old zinc	4 — 4½
Zinc routings	3 — 3¼
Old die cast scrap	2 — 2¼

Nickel and Monel

Pure nickel clipping	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	79 —80
No. 1 pewter	59 —60
Auto babbitt	43 —44
Mixed common babbitt	10¼—10¾
Solder joints	14½—15
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.85 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Nov. 28, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25* lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for .50 lb. base box for .45 lb. deduct 15¢; for .55 lb. add 15¢; for .60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	6.15 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	Holloware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets. (Effective Nov. 28, 1960) †† 7.425 at Sharon; Niles is 7.225.

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B1*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.90 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1, A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1, Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Nov. 28, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (10 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structurals	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	$.10	7.87	9.71	10.16	10.78	8.44	9.13	8.65	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.03	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.20	.....	11.39	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.03	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.80	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.50	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.61	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 8 x 12.5; Hot-rolled bar—Rounds—⅞-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅜"; cold drawn—15/16" to 2⅜" round; Hot-rolled 4140—⅝" to 2⅜" round, cold drawn—15/16" to 2⅜" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Nov. 28, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50c per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

		Discount Screws	Bolts
Full Cartons		46	46
Machine Screws—bulk			
¼ in. diam or smaller	25,000 pcs		50
5/16, ⅜ & ½ in. diam	15,000 pcs		50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

		Discount Hex	Square
Full Cartons		46	57
Bulk			
¼ in. diam or smaller	25,000 pcs		
5/16 or ⅜ in. diam	15,000 pcs	56	60
		56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Nov. 28, 1960)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50–32.75	32.00	29.50–34.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Detroit, *M2*; Louisville, O., *R5*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville Pa., *U2*; Detroit, *M2*; Detroit, *S1*; Canton, Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown. *R5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); W. Leechburg, Pa., *A3*; Bridgeville Pa., *U2*; Detroit, *M2*; Detroit, *S1*; Canton, Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown. *R5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Ambridge, Pa., *B7*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Newark, N. J. *D2*, Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*; Detroit, *R5*; Reading, Pa., *C2*; Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Ambridge, Pa., *B7*; Baltimore, *E1*; Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forging billets: Ambridge, Pa., *B7*; Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet. *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Reading, Pa., *C2*.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3*‡‡‡	173	190	...	...	190	9.00	9.675
Atlanta *A8*‡‡	173	191	...	212	197	9.00	9.75
Bartonville *K2*‡‡	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Chicago *W7*	173	...	...	...	...	9.00	9.55†
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dav. *M4*‡‡	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3*‡‡	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9*‡	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2*‡‡‡	...	...	...	...	...	9.95	10.625
Kansas City *S2*‡	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
SparrowsPt. *B3*‡‡	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1*‡	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. ‡‡‡ .10¢ zinc.
‡‡ 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ⅛, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

Stainless pipe and fittings

IN STOCK

Your complete stainless piping package is available for immediate shipment in a variety of sizes and analyses.

PIPE: ⅛ IPS through 12" IPS seamless and welded schedules 5 - 80

FITTINGS: ⅛ IPS through 4" IPS threaded and welding type

VALVES: ¼ IPS — 2" IPS

Also mill shipments of corrosion resistant items up to 48" OD. Send for FREE literature.

C. A. ROBERTS CO.

Steel Tube Specialists

Dept. J-12 • 2401 25th Avenue • Franklin Park, Illinois

6 Warehouses serving the middlewest

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C ELECTRIC FURNACE STEEL CASTINGS

are engineered to *YOUR* specific requirements

"C" steel castings are CLEAN steel castings of uniform structure that will minimize machining and assembly costs, permit of greater freedom and efficiency of design and add to your product the recognized strength, endurance and desirability of steel. C steel castings, foundry engineered from pattern to finished casting can be had in

CARBON, ALLOY OR STAINLESS STEEL SAND OR SHELL MOULDED

The technical experience and knowledge of our engineering staff are at your service. Write, phone, or call.

CRUCIBLE STEEL CASTING CO.

LANSDOWNE PENNA.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

Rolled elliptical, 18 in. or longer, 5000 lb lots 43.50

Electrodeposited, 5000 lb lots ... 36.50

Brass, 80-20, ball anodes, 2000 lb or more 50.50

Zinc, ball anodes, 2000 lb lots 20.25

(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225

(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.50

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum, N. Y.. 65.90

Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45

Nickel sulfate, 5000 to 23,000 lbs... 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 25.00

Zinc cyanide, 100 lb, N. Y. 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more, N. Y. 30.94

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R. 11.50

Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots 25.75

Carbonyl Iron (200 lb lots) 88.00

Welding Grades 8.10

Cutting and Scarfing Grades 9.85

Hydrogen reduced, domestic 11.25

Copper Powders

Molding Grades

Electrolytic, domestic, f.o.b. shipping point. 15.00†

Atomized ..... 43.3 to 61.3

Reduced ..... 15.00†

Chemically Precipitated 44.5

Brass, 5000-lb lots ..... 35.2 to 50.1

Bronze, 5000-lb lots ..... 51.3 to 55.2

Chromium, electrolytic 5.00

Lead ..... 7.50†

Manganese, electrolytic ... $1.00

Molybdenum .....$3.60 to $4.35

Nickel $1.15

Carbonyl Nickel, 20,000 lb lots $1.01

Nickel-Silver, 5000 lb lots.. 58.8 to 66.9

Silicon 70.00

Solder ..... 7.00†

Stainless Steel, 316 ..... $1.07

Stainless steel 304 ..... 89.00

Tin ..... 14.00†

Titanium, 99.25 + pct, per lb, f.o.b. $11.25

Tungsten, carbide grades... $3.25

Zinc ..... 21.0 to 34.2

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	.....	.....
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.30	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 43.40; 1 side, 36.35.

(Effective Nov. 28, 1960)

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.... $185.00

High duty (except Salina, Pa., add $5.00) 140.00

Medium duty 125.00

Low duty (except Salina, Pa., add $2.00) 103.00

Ground fire clay, net ton, bulk... 22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00

Childs, Hays 163.00

Chicago District 168.00

Western Utah 183.00

California 185.00

Super Duty

Hays, Pa., Athens, Tex., Windham, Warren, O. 163.00-168.00

Silica cement, net ton, bulk, Chicago 26.75

Silica cement, net ton, bulk, Ensley, Ala. 27.75

Silica cement, net ton, bulk, Mt. Union, Pa. 25.75

Silica cement, net ton, bulk, Utah and Calif. 39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md. $620.00

Gary, Ind. 658.50

Standard, Pascagoula, Miss. 647.50

Standard chemically bonded, Curtiner, Calif. 119.00

Burned, Baltimore 585.00

Magnesite Brick

Standard, Baltimore $715.00

Chemically bonded, Baltimore 655.00

Chemically bonded, Pascagoula, Miss. 682.50

Grain Magnesite

St. ⅜ to ½-in. grains

Per net ton

Domestic, f.o.b. Baltimore in bulk. $73.00

Domestic, f.o.b., Pascagoula, Miss... 80.00

Domestic, f.o.b. Chewalah, Wash., Luning, Nev.

in bulk 46.00

in sacks 52.00-54.00

Dead Burned Dolomite

F.o.b. bulk, producing points in:

Pa., W. Va., Ohio $16.75

Missouri Valley 16.60

Midwest 17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.

RAILWAY EQUIPMENT
USED and RECONDITIONED
RAILWAY CARS and REPAIR PARTS

BOX CARS
50—All-Steel, 50-Ton Capacity
Suitable for loaded interchange service.
FLAT CARS
5—50-Ton Capacity
HOPPER CARS
Open Top—Also COVERED
Excellent Condition — Immediate Delivery

DIESEL-ELECTRIC LOCOMOTIVES
25-Ton to 120-Ton. Std. Ga.

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51-B E. 42nd St. New York 17, N. Y. Ph. YUkon 6-4766

IMMEDIATELY AVAILABLE
Because of Mill Consolidation
3 LEE WILSON RECTANGULAR BELL-TYPE ANNEALING FURNACES
atmosphere-controlled with 9 bases, are available. Each is approximately 7' x 7' x 14'. Excellent when used for manufacture of steel coils, they have a capacity of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.
NATIONAL MACHINERY EXCHANGE
126 Mott St. New York 13, N. Y.
CAnal 6-2478

VARIABLE VOLTAGE DRIVES
3 PHASE 60 CYCLE

Quan.	Size	Description
2	3000 HP	DC MOTORS—525 V. 600 RPM Whse. M. G. Sets—2500 K.W. Whse., 2300/4160 V.
1	2750 HP	DC MOTOR 450 V. 300 RPM Elliott 2200 K.W., Gen. Elec. 3 unit 450 V. DC Gen. with 3000 H.P. 720 RPM, 2300 V. AC Motor and Etc.
1	2250 HP	DC MOTOR 600 V. 400/500 RPM, G.E. M.G. Set—2000 K.W. G.E. AC Motor—2300 V.
1	1500 HP	DC MOTOR 600 V. 600 RPM Whse. M. G. Set. 1500 K.W. G.E. 13,200 V.
1	1500 HP	DC MOTOR 600 V. 300/700 RPM Whse. M.G. Set—1500 K.W. G.E. 13,200 V.

For listing of Motors, Generators, Transformers, M.G. Sets, Rectifiers, Mill Motors, etc.
See last week issue.
Write — Phone — Wire
BELYEA COMPANY, Inc.
47 Howell St., Jersey City, N. J.
Tel. Oldfield 3-3334

FOR SALE
ALUMINUM SHEET AND STRIP ROLLING PLANT
Complete with Melt Furnaces, Slab Molds, Hot & Cold Sheet Mills, Shears, Slitters, etc. Monthly finished capacity—2,000,000 pounds.
CURRY & HUDSON ASSOCIATES, INC.
ONE GATEWAY CENTER, PITTSBURGH 22, PA.

Detroit Buyers Want 'Prime' Equipment

Used machinery dealers in Detroit say equipment must be in prime condition.

The bigger dealers say business is fair. However, the smaller ones claim the Midwestern market is miserable.

■ Pressure is being put on used machinery dealers in Detroit to put their wares in prime condition. In order to sell machines, they must be overhauled to the point where, regardless of age, they offer tolerances to original machine accuracy.

The president of one of Detroit's largest dealerships told The IRON AGE, "The demand for used machine tools is for completely reconditioned or rebuilt equipment."

Dealers who are able to do this —usually only the largest ones— claim the Motor City's present market is fair. It's not much different from the period immediately following the steel strike.

The Other Side—Yet, smaller dealers with less money to sink into major manufacturing activities complain that the Midwestern market is as miserable as ever.

The inventory picture varies considerably. In some cases, dealer stocks are disappearing because replacements are not being made in an effort to cut overhead. However, in some larger warehouses, inventories are as much as 30 pct higher than last year. And there is an interest in additional purchases.

In short supply, generally, are standard machine tools built since 1950. Tools for jet engine manufacturing, though, are plentiful. Another strong area is for cutoff and bending machines for the making of tubing equipment.

There is fair demand for structural steel and sheet metal equipment such as shears and brakes.

Soft Areas—A very soft market prevails for production type machinery that the government has been selling in wholesale quantity. Tool room items are hard hit, too.

To the dismay of Detroit dealers, auctions are drawing interest as dealers and potential buyers vie for bargains. This situation has, at times, forced dealers to cut prices to the bone. Some brokers say prices are now as low as they've been for a long time. And dealers admit they are willing to drop the price on certain machines in order to make a sale.

Less Inquiries—In line with the national situation, Detroit dealers note that the rate of inquiries has fallen off and there are fewer shoppers coming around to inspect the stock.

Exports are still a big factor in the used machinery market despite the weakening overseas automobile market. One interesting development last week was the shipment of a 225-ton, double-acting toggle press by a Detroit press dealer to a London dealer for installation in a factory. The big, 26-year-old machine, with a replacement value of $250,000, was sold for $50,000.

Dealers think the export situation will remain about the same. But they caution that it could slacken somewhat due to dollar convertibility.

SHEET METAL MACHINERY

SPECIAL! 13' 3/8" Shear, 20" gap . . . $5,000.00
10' 3/8" Shear, 16" gap, extra blades.
Marshalltown Throatless Shear, 1/4" cap.
60 ton Niagara Punch Press, 22" throat.
50 ton Federal Punch Press, #5 OBI.
43 ton Niagara Punch Press, 20" throat.
Ransome Welding Positioner, Cap. 2500 lbs. Variable Speed Drive, Two Tables.
100 KVA Acro Welder, Air Press, 440 volt.
No. 2 National Nail Making Machine, 4 to 12 Penny.
8' 12 ga. Sturdybender Press Brake.
10 FT. ENGEL SHOPMASTER DUCT TABLE.

MILTON EQUIPMENT COMPANY
4th & Race Sts. Phila. 6, Pa.
WAlnut 2-1734, 3488

LIFTING MAGNETS

A complete magnet service. Magnets, new & rebuilt, generators, controllers, reels, etc.

Magnet specialists since 1910

Goodman Electric Machinery Co.
1060 Broad St. Newark 2, N. J.

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

"PACKAGE DRIVES"
FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor 90/180 R.P.M. and 3000-KW. Al-Chal. M-G Set, 600-VDC & 5000-HP Syn. Motor, 13800/6900/4160-VAC.
(1)—2200-HP Whse. Motor 92/132 R.P.M. and 2000-KW M-G Set, 600-VDC & 2750-HP Syn. Motor, 4160/2300-V.
(1)—1500-HP G.E. Motor, 165/280 R.P.M.
OR
(1)—1500-HP Whse. Motor, 300/700 R.P.M. and 1500-KW G.E. M-G Set, 250-VDC, 2100-HP Syn. Motor, 4600/2300-VAC.
(2)—750-HP Whse. Motors, 300/700 R.P.M. and 3-unit M-G Set, (2) 600-KW Generators and 1750-HP Syn. Motor, 4000/2300-VAC.
(2)—235-HP Whse. Motors, 325/975 R.P.M. and 3-unit M-G Set, (2) 250-KW Generators and 700-HP Syn. Motor, 4000/2300-VAC.
All D.C. Motors are enclosed, forced ventilated; will sell any of these items separately; can also supply Starting Equipment for Syn. Motors, Exciter Sets and D.C. Control.

SPECIAL — Outdoor Air Circuit Breakers, G.E., type ARA, 1200 amps., 14.4-KV, 1000-MVA Int. Capacity.

T. B. MAC CABE COMPANY
4302 Clarissa St., Philadelphia 40, Penna.
Cable Address "Macsteel" Philadelphia Pa.
Phone Davenport 4-8300

COMPRESSORS

No better values at any price

100 CFM 100 psi 6 x 7 Ing. or Worth.
138 CFM 100 psi 7 x 7 Ing.—CPT—Worth.
142 CFM 125 psi Ingersoll Rand Type 40-Imagr.
182 CFM 150 psi 7 x 7 Joy WG8.
181 CFM 300 psi 8-4½ x 9 EB-2.
184 CFM 125 psi 7-7-6 x 5 Worth. M48.
254 CFM 100 psi 9 x 9 Ing.—Worth. Chic. Pneu.
290 CFM 75 psi 10 x 9 Ing. EB-1.
384 CFM 100 psi 10 x 9 Joy WG9.
465 CFM 100 psi 12 x 11 IR—Amer.
542 CFM 125 psi 12 x 13 Ing. Rand, Worth
586 CFM 100 psi 10-9½ x 12 Ing.
600 CFM 125 psi 11½ x 7 x 7 Joy WN 102.
676 CFM 100 psi 15-9¼ x 12 Ing. XRB.
800 CFM 100 psi 14 x 13 IR—CPT.
877 CFM 125 psi 17/10½ x 14—IR—XRB.
1055 CFM 110 psi 10-11 x 12 CP. OCE.
175 hp G.E. Sym 5-60-200 volts, starter—MG set—Aftercooler Receiver.
1079 CFM 100 psi C300-300H Fuller Rotary.
300 hp West. Sym. 5-60-440, 80% PF.
Portable Gas-diesel 90°-600'.

AMERICAN AIR COMPRESSOR CORP.
DELL AND IRON STREETS
NORTH BERGEN, N. J.
Telephone UNion 5-4858

UNIVERSAL Machinery & Equipment Co.

AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

- **ARC MELTING FURNACES**
250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge
DETROIT FURNACES—10 lb. to 3000 lb. Cap.
- **INDUCTION HEATING FURNACES**
75 KW TOCCO M.G. Induction Heater 2 station
20 KW THERMONIC Induction Heater 2 station
20 KW ECCO Induction Heater
15 KW GIRDLER Dielectric Heater
- **INDUCTION MELTING FURNACES**
20 KW AJAX Spark Gap 17# Melting
30 KW VACUUM Melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel
- **HEAT TREAT FURNACES**
36"x72" Gas Fired Box, 1950°F.
4'x4'x10' Gas Fired Box
7' G. E. Rotary Hearth Electric, 1900°F.
36" dia. x 36" deep Electric Recirculating
42" wide roller Hearth 50'L w/atmos. gen.
24"x16'Lx36" 210 KW conveyor. 1400°F.
10"x12"x24" LINDBERG 2500°F. hydrogen
- **CLEANING EQUIPMENT AND GRINDERS**
15x20 WHEELABRATOR
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
48x42 WHEELABRATOR w/loader
48x72 WHEELABRATOR w/loader
dust Collectors available for all machines
#1A WHEELABRATOR Multi-table
#2 WHEELABRATOR Multi-table
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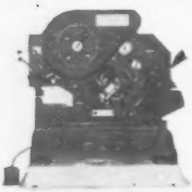

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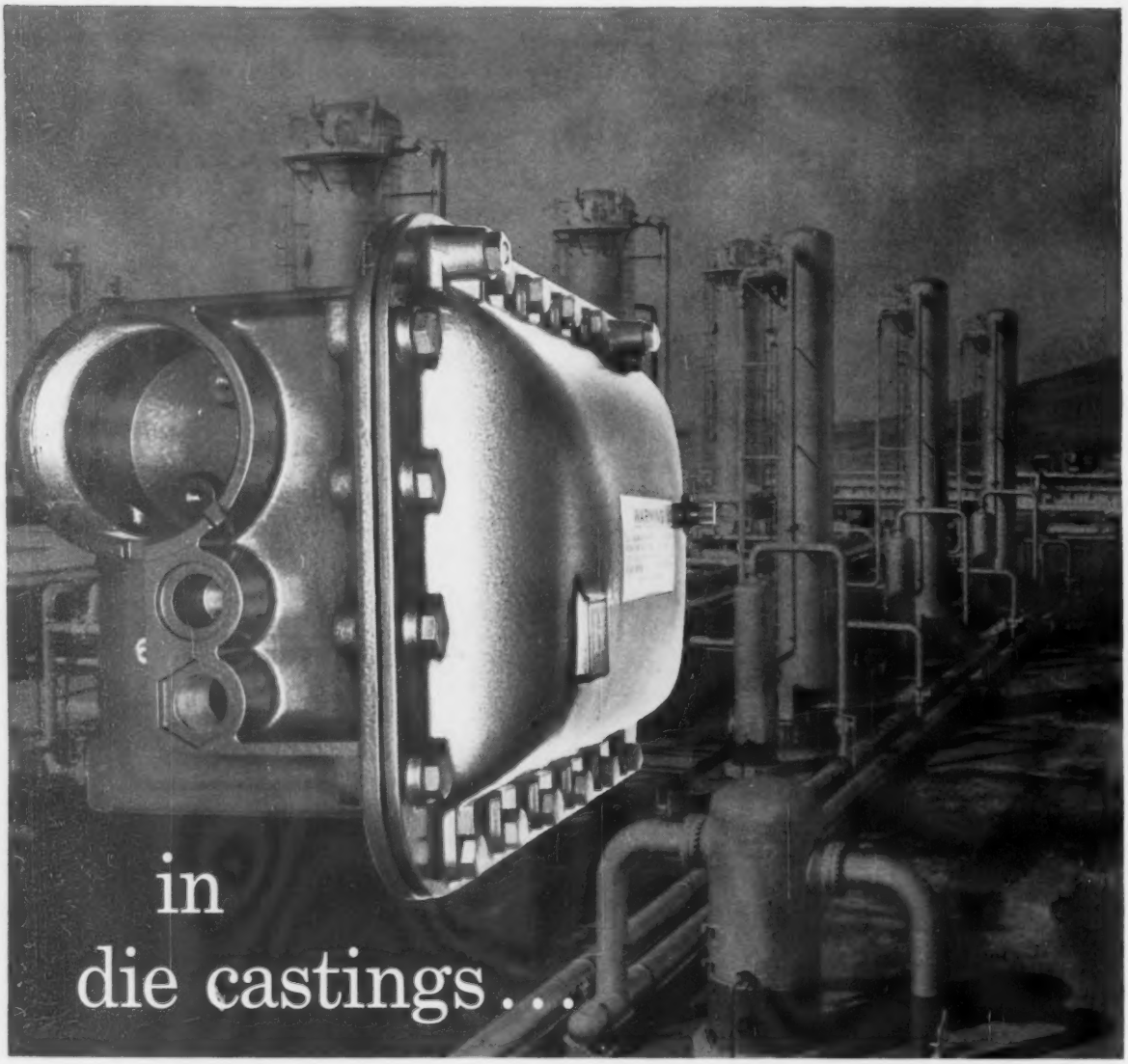

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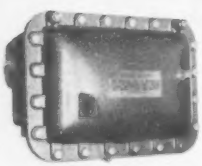

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These were stiff conditions—demanding a new application of the die-casting process.

Honeywell turned to Alcoa—the company with the most experience in the aluminum industry.

Working closely with Honeywell, Alcoa development engineers designed a die casting that's little short of stupendous. It's made of Alcoa's new high-strength, high-elongation casting alloy 364, which has the properties of alloy 218. Yet, the new alloy is more economical because it is easier to cast.

Hydrostatic tests proved that sand-cast prototypes withstand 500 psi, more than enough to assure that castings would withstand explosive pressures up to 125 psi. Mating faces—*as cast*—meet with an integrity that eliminates any need for a gasket.

In castings as well as forgings, impacts, extrusions and screw machine parts, Alcoa puts the metal where you want it. Learn more about Alcoa's ingenious solutions to difficult design problems—write to Aluminum Company of America, 907-M Alcoa Building, Pittsburgh 19, Pa.

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ALCOA ALUMINUM

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TRABON®

CENTRALIZED LUBRICATING SYSTEMS

Close-up shows Trabon feeders and lubricant lines protecting a quarry jaw crusher.

No bearing wear in 9 years of shock loads — abrasive dust

Jaw Crusher Bearings Stay Young and Healthy Protected by Trabon

"Downtime" is an unknown word at Millwood Sand's plant at Howard, Ohio. This happy state of affairs is due to a busy Allis-Chalmers Jaw Crusher installed in 1951 that has never had a bearing replacement or even a shim adjustment for wear take-up on the bearings. Reason is that bearings are protected by a Trabon automatic centralized grease system.

Imagine the savings that have accrued during these 9 years in:

1. Elimination of "downtime" with uninterrupted production
2. Elimination of bearing replacement costs and millwright labor
3. More efficient application of lubricant
4. Reduction of power costs and smoother operation
5. Elimination of hand lubrication man-hours.

If Trabon can perform so reliably under conditions of shock load, abrasive grit and dust for 9 years (incidentally, without replacement of a single Trabon part) —you can be sure it will provide the same dependable protection for *your* machine or plant.

Trabon oil and grease systems; *first with central warning in case of blockage;* first with a *positive* lubrication system—make sure that every bearing gets a positive, piston-displaced, measured shot of lubricant. No bearing gets skipped, forgotten or under-lubricated.

Whether your machine requires grease, oil, circulating oil or gear spray you can rely on Trabon. Call your local Trabon representative for help and advice.

"Centralized" OIL AND GREASE SYSTEMS "Meterflo" CIRCULATING OIL SYSTEMS "Meter-Mist" OIL SYSTEMS

Trabon® **Trabon Engineering Corporation** 28815 Aurora Road • Solon 39, Ohio

Production line strapping of tin plate coils

Packaging of tin plate coils is now on a production line basis in speed and low cost. Fast, dependable Signode air power tools take ¾″ and 1¼″ steel strapping from the dispenser, eliminating the waste of cut-to-length strap. Overhead tool suspension systems and engineered dispensers add mobility and save more time and effort. Engineered installations by Signode save time and money. Write for more information. Ask for free copy of "Air Power Tensioners and Sealers."

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